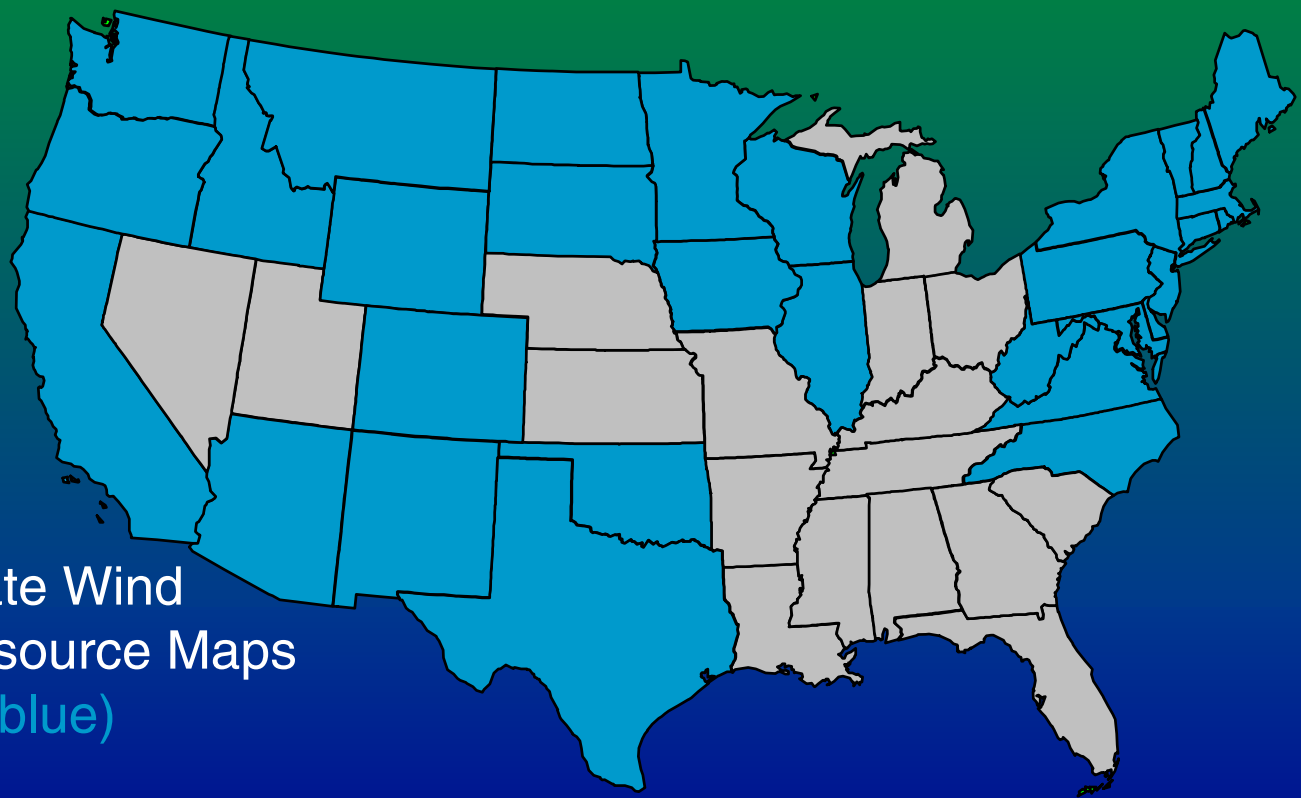
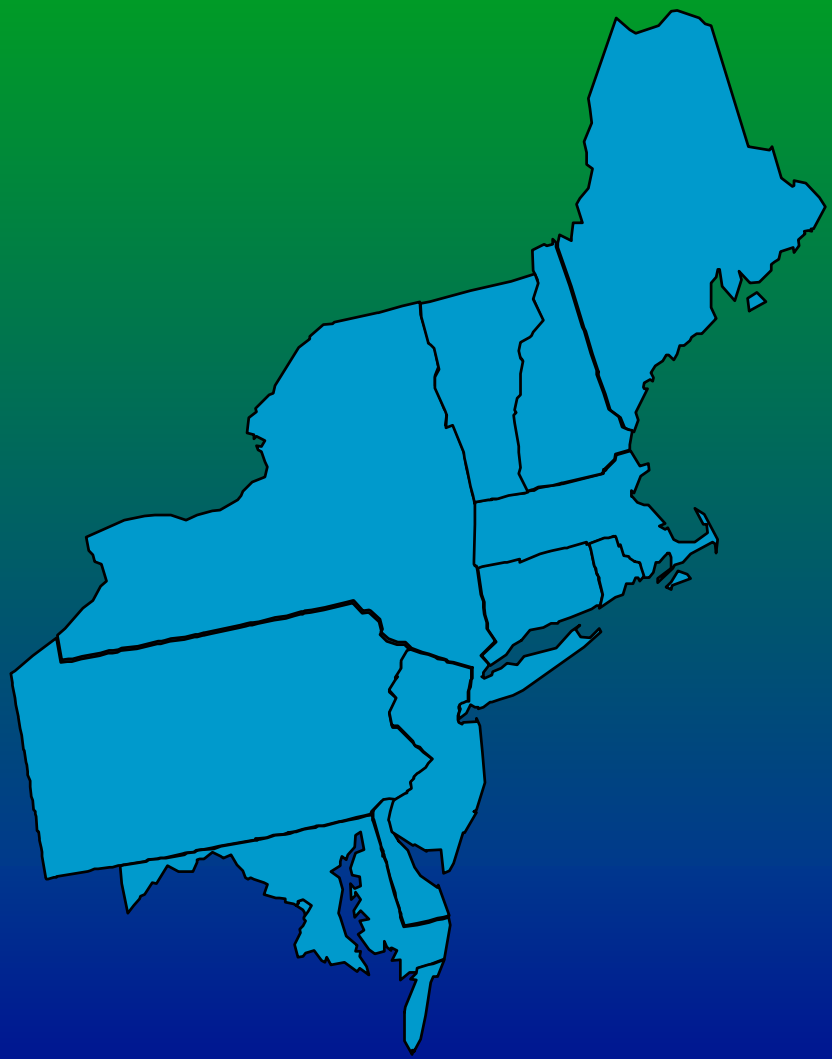
Renewable Resources

- Wind Resource
  - Wind Power Classes
  - U.S. Wind Resource
  - Rayleigh Distribution
- Solar Resource
  - U.S. Solar Resource
  - U.S. PV Productivity
  - Complementary with Wind

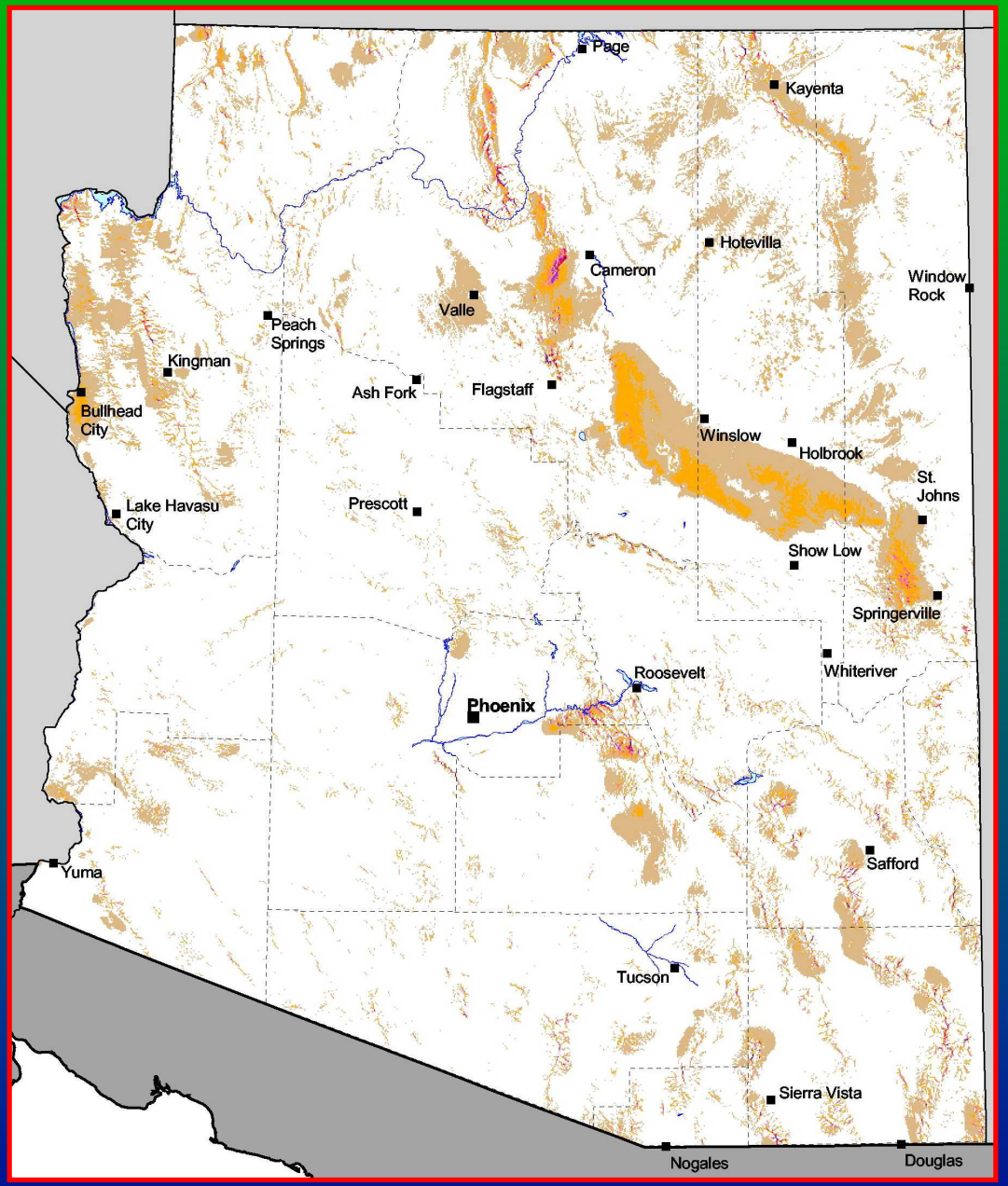


State Wind Resource Maps (in blue)

State Wind Resource Maps



Arizona Wind Resource Map



Small Wind Turbine Productivity Estimates*

Wind Power Class	Productivity per m² of swept area** (kWh/year)	Wind Power Density at 33 ft (10 m) (W/m²)	Wind Speed at 33 ft (10 m) (mph)	Wind Speed at 33 ft (10 m) (m/s)
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2	350 - 500	100 - 150	9.8 - 11.5	4.4 - 5.1
3	500 - 610	150 - 200	11.5 - 12.5	5.1 - 5.6
4	610 - 690	200 - 250	12.5 - 13.4	5.6 - 6.0
5	690 - 770	250 - 300	13.4 - 14.3	6.0 - 6.4
6	770 - 880	300 - 400	14.3 - 15.7	6.4 - 7.0
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* Estimates are based on different models and sizes of wind turbines assuming a tower height of 80 ft (24 m).

** For systems of different sizes, multiply the estimated productivity by the total swept area of the turbine.

California Wind Resource Map

Small Wind Turbine Productivity Estimates*

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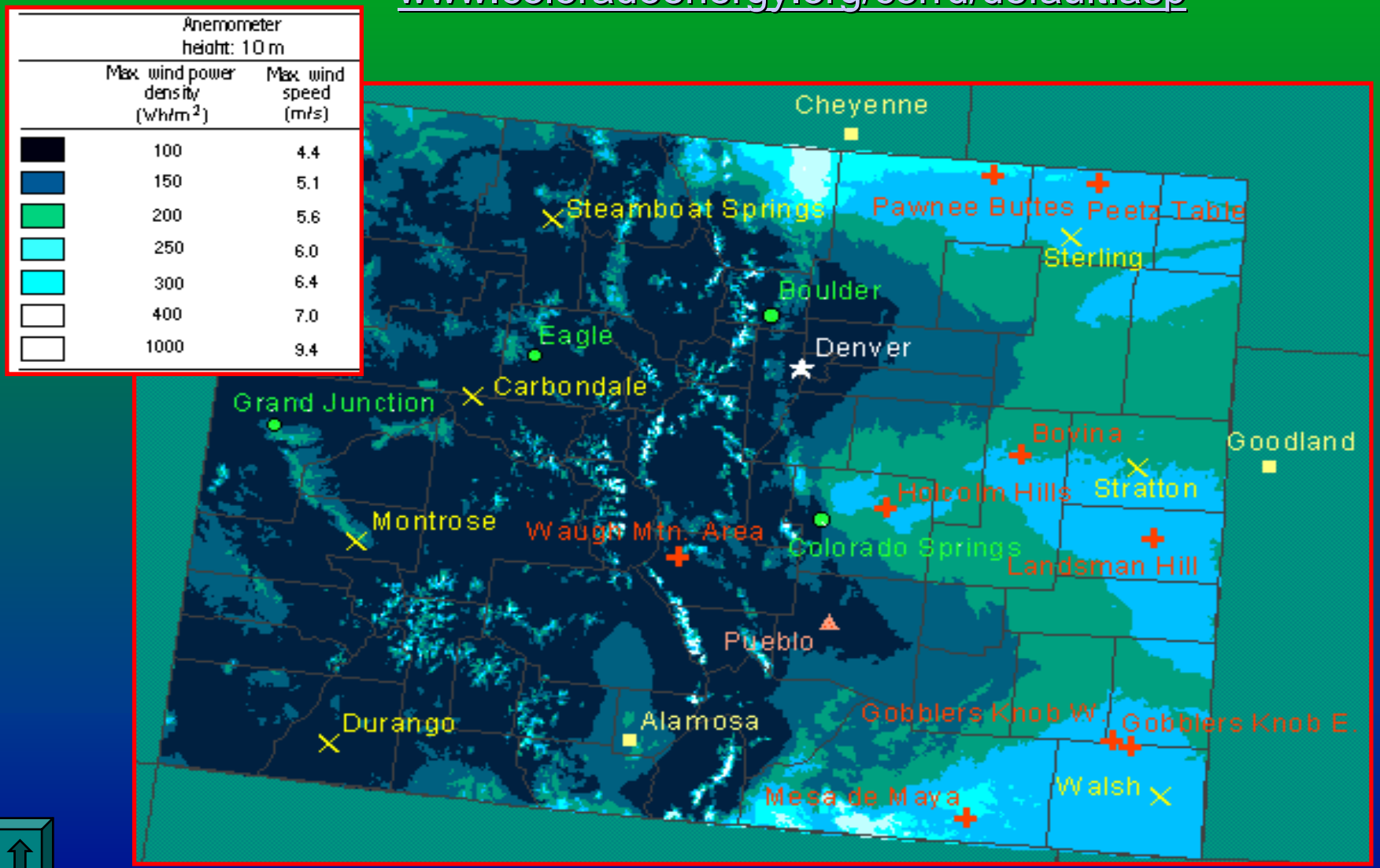
Colorado Wind Resource Map

www.coloradoenergy.org/corrd/default.asp



Connecticut Wind Resource Map

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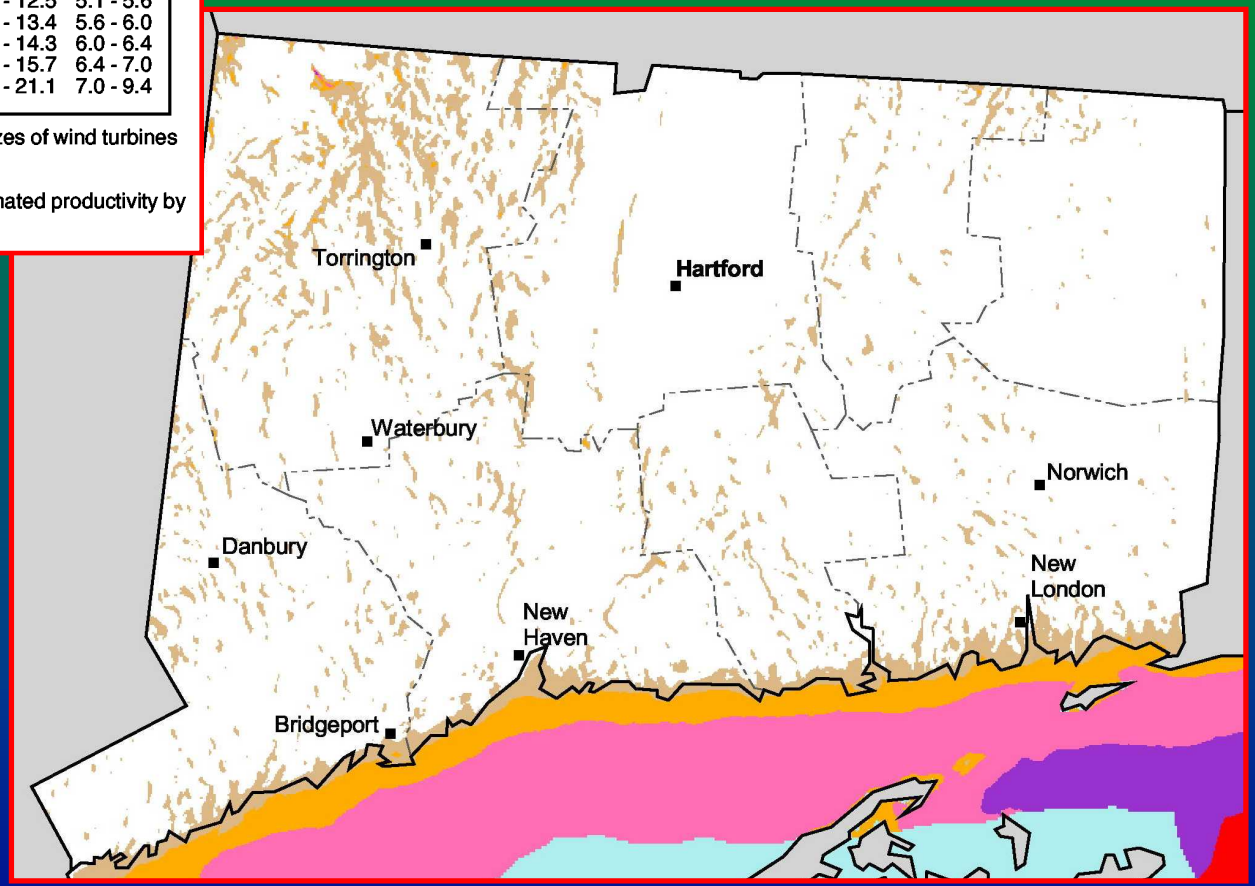
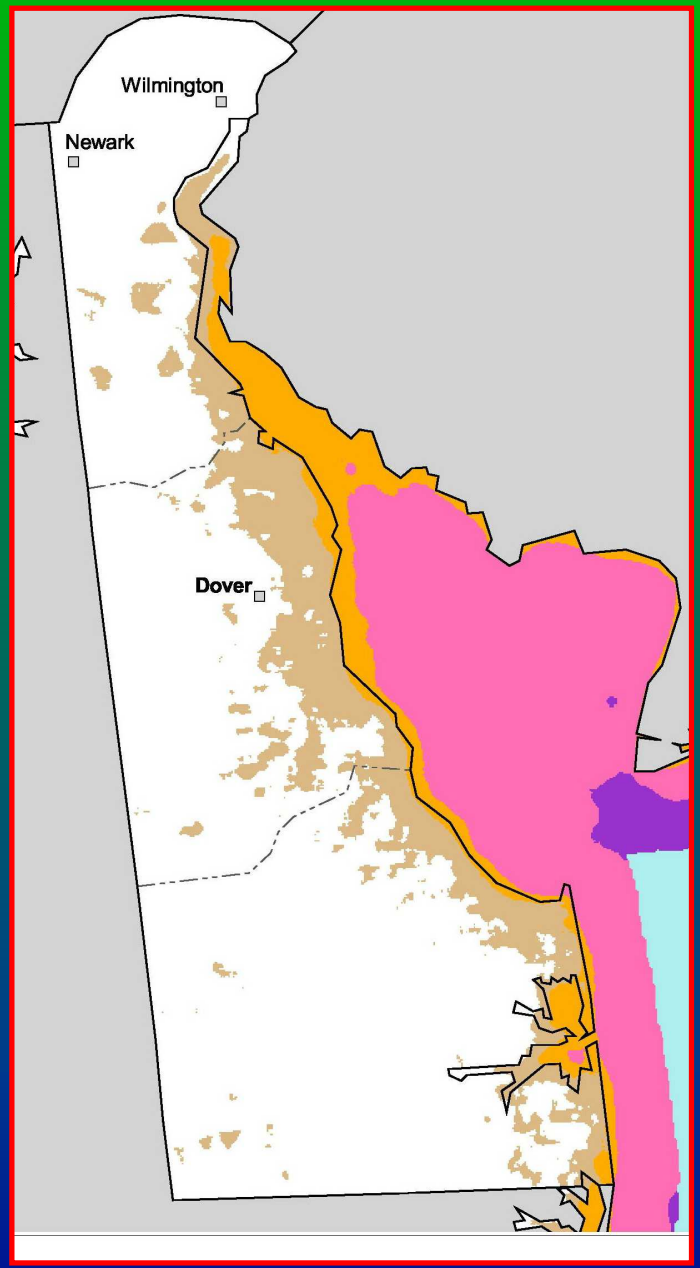


Delaware Wind Resource Map



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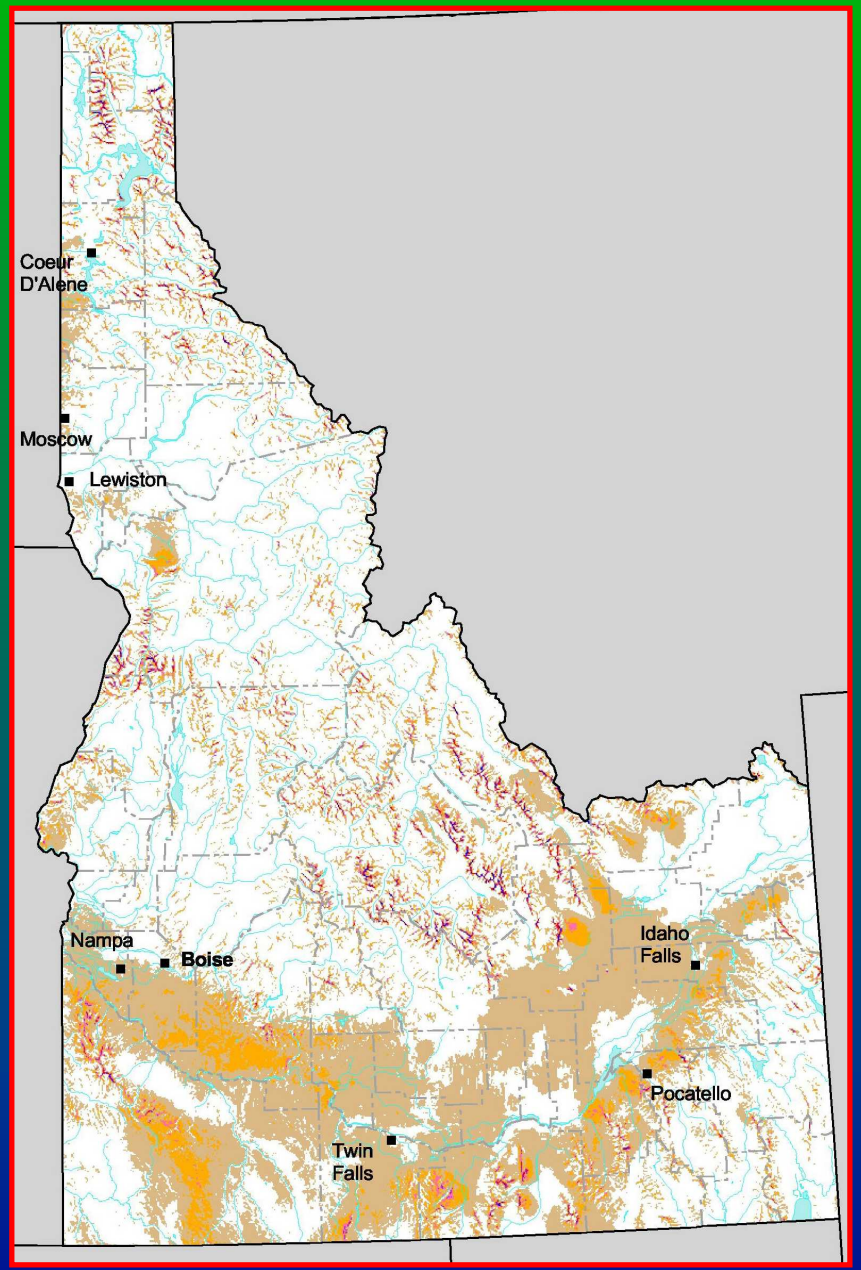
Idaho Wind Resource Map



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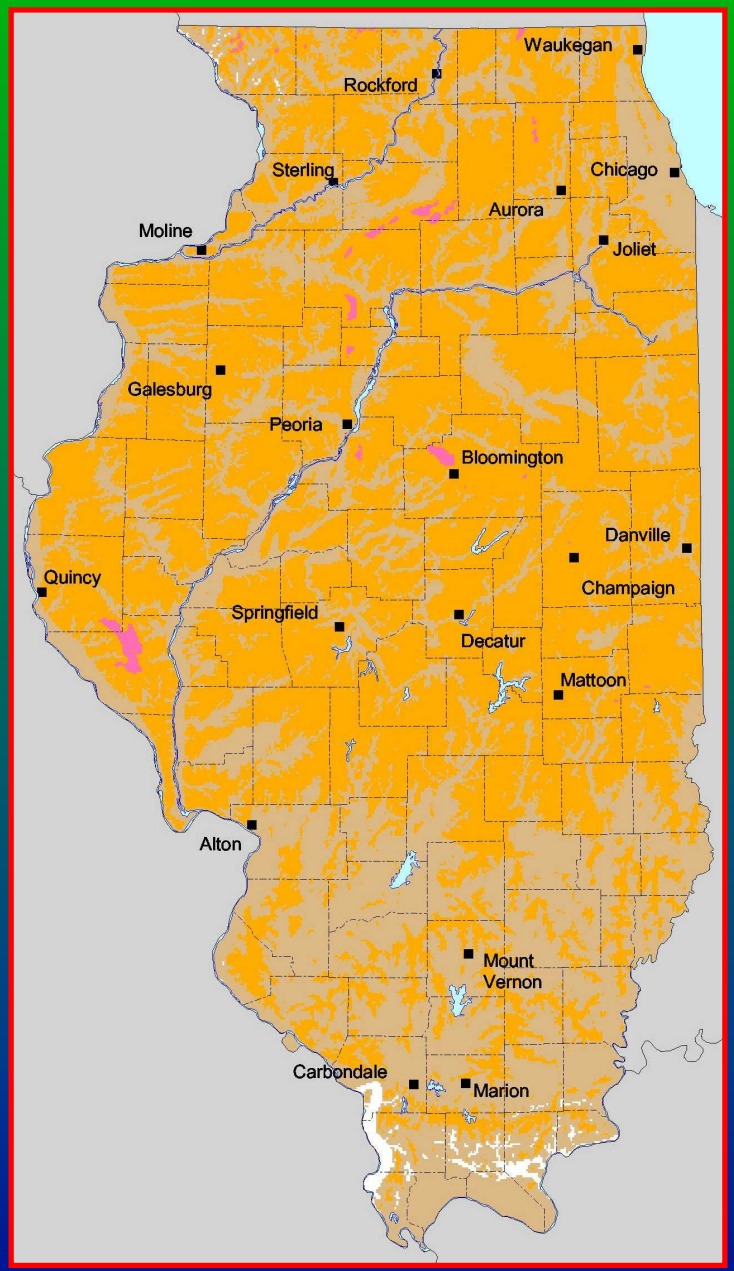
Illinois Wind Resource Map



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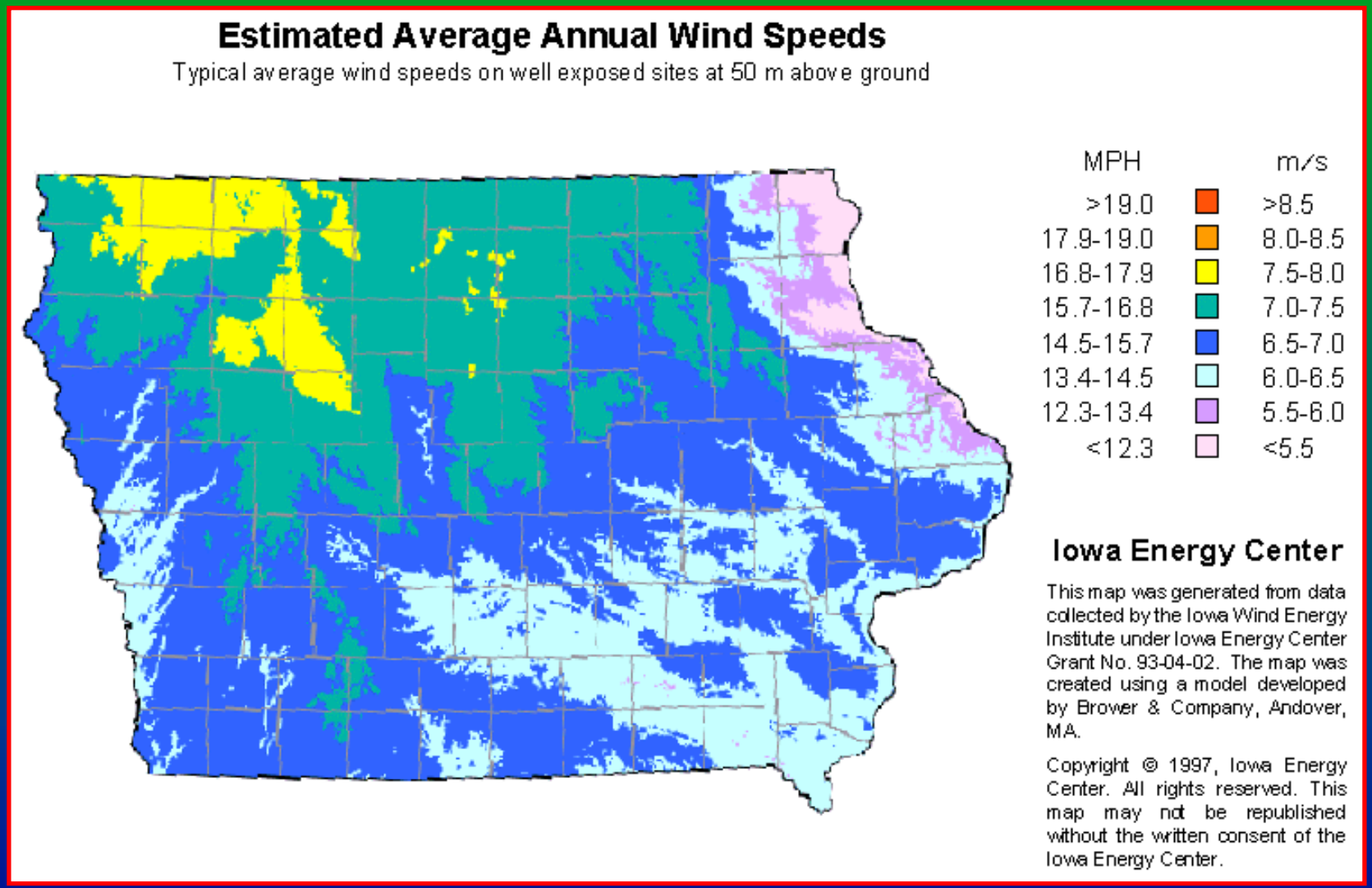
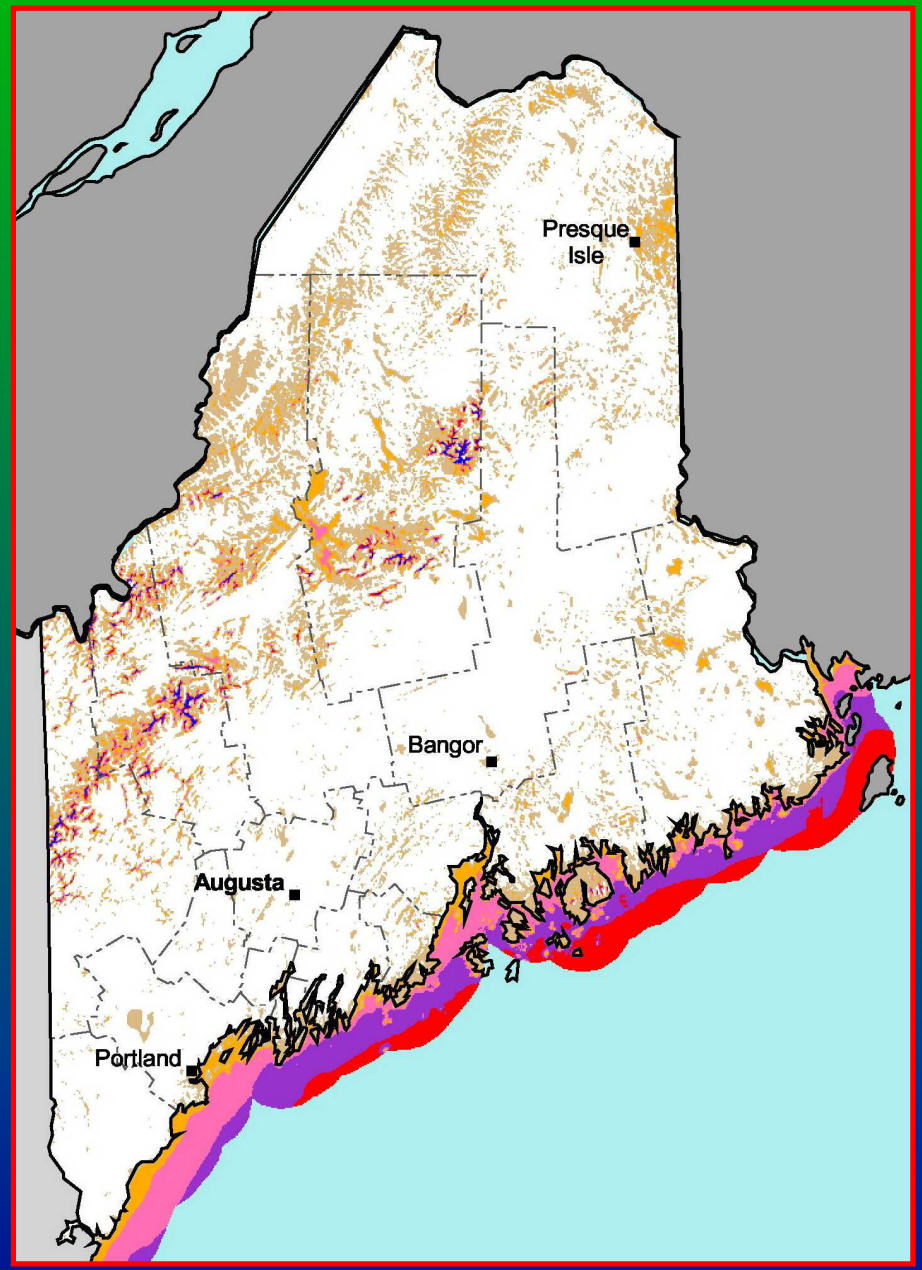
Iowa Wind Resource Map

www.energy.iastate.edu/renewable/wind/maps-index.html



Maine Wind Resource Map



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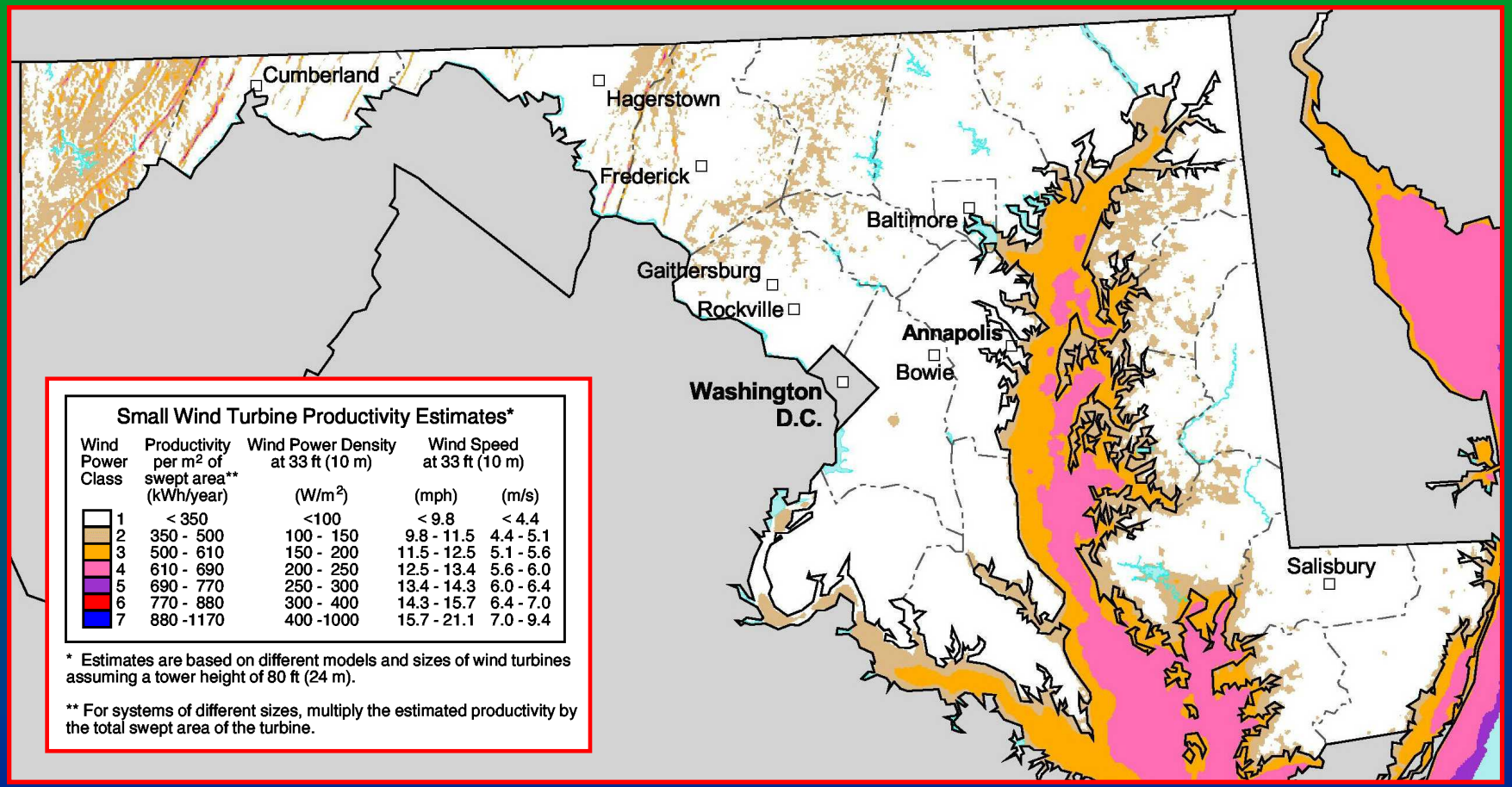
Maryland Wind Resource Map



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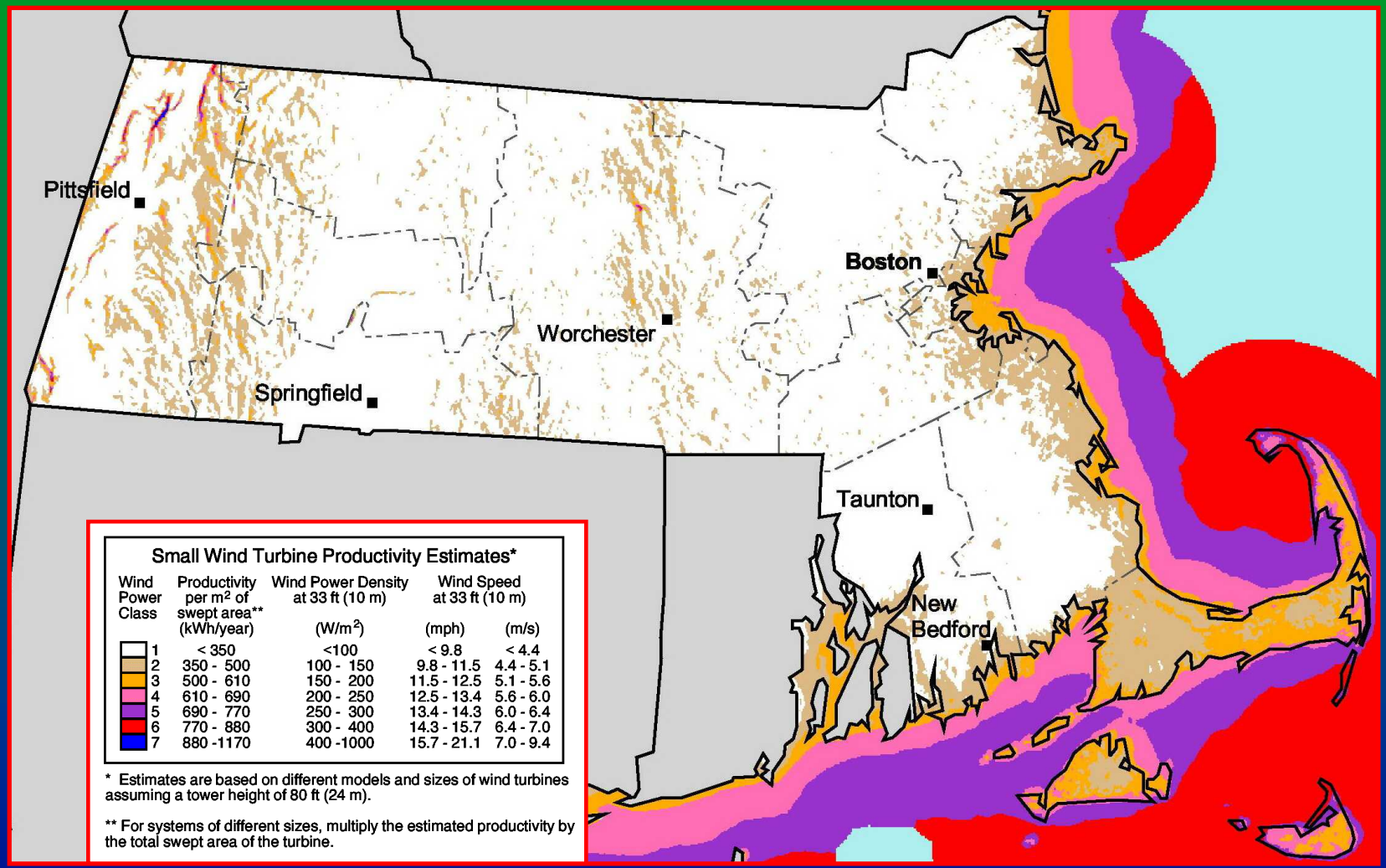
Massachusetts Wind Resource Map



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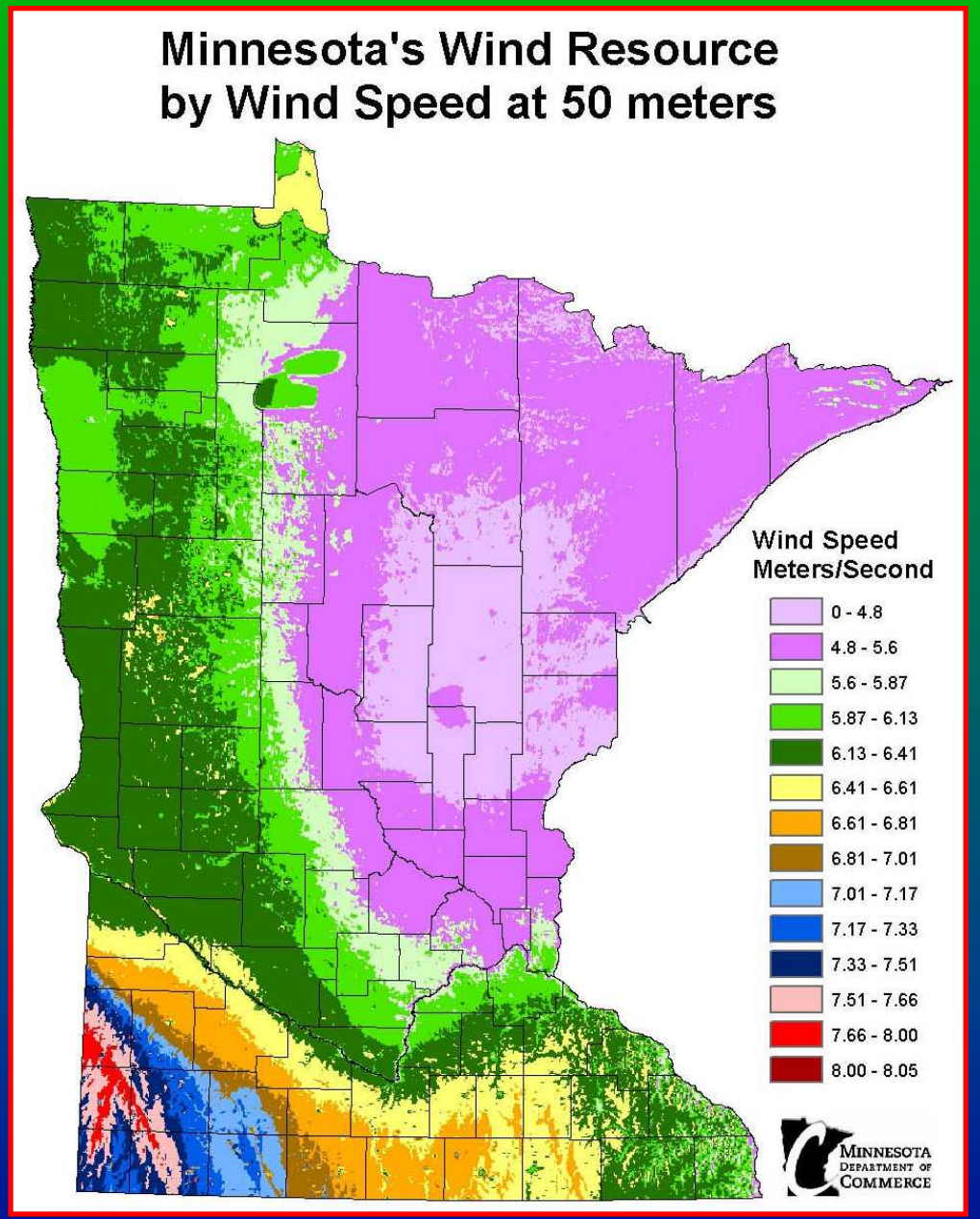
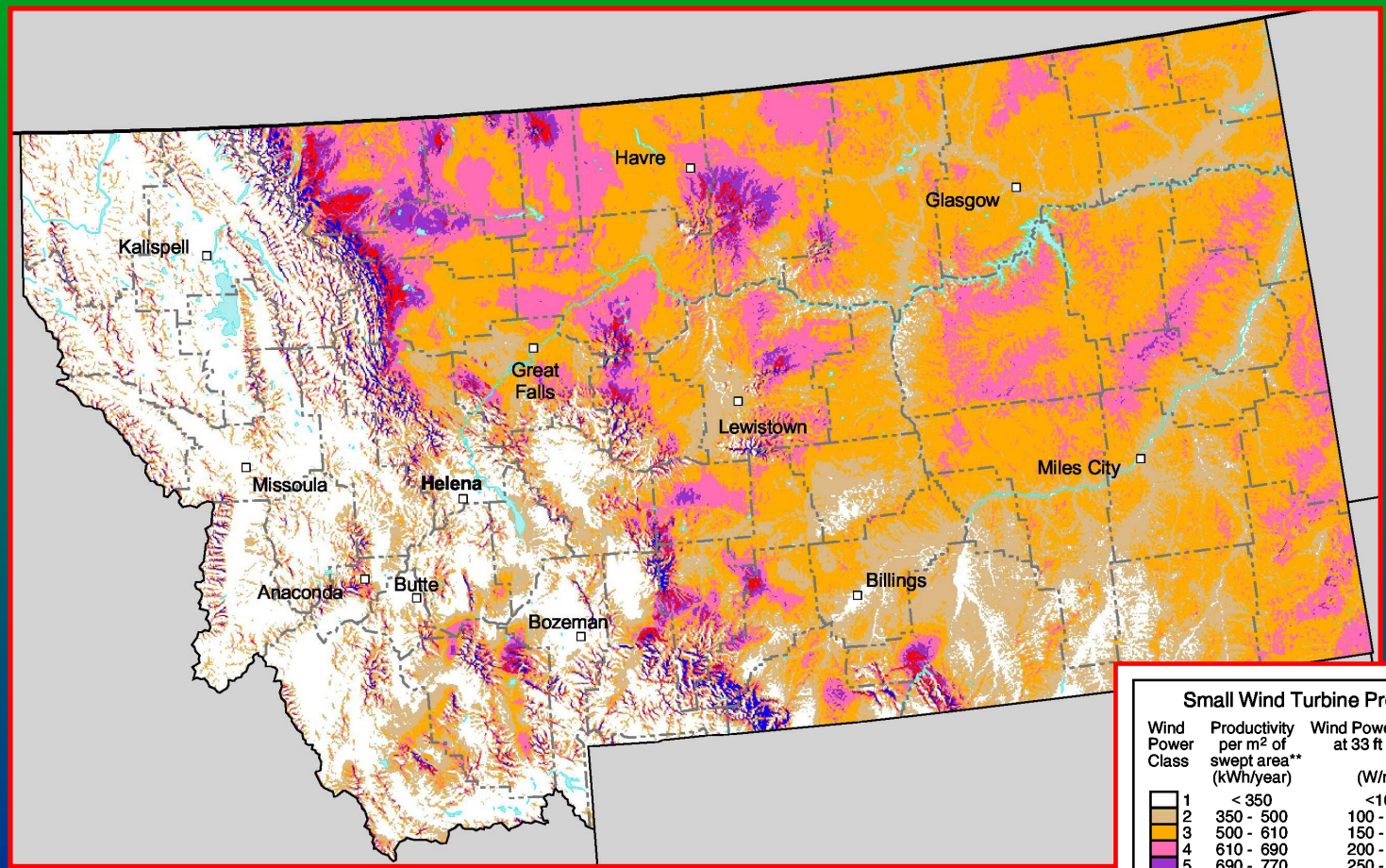
Minnesota Wind Resource Map

www.state.mn.us/mn/externalDocs/Wind_Speed_at_50_Meters,_.jpg_file_1108020948 22_50spdLG.jpg



Montana Wind Resource Map



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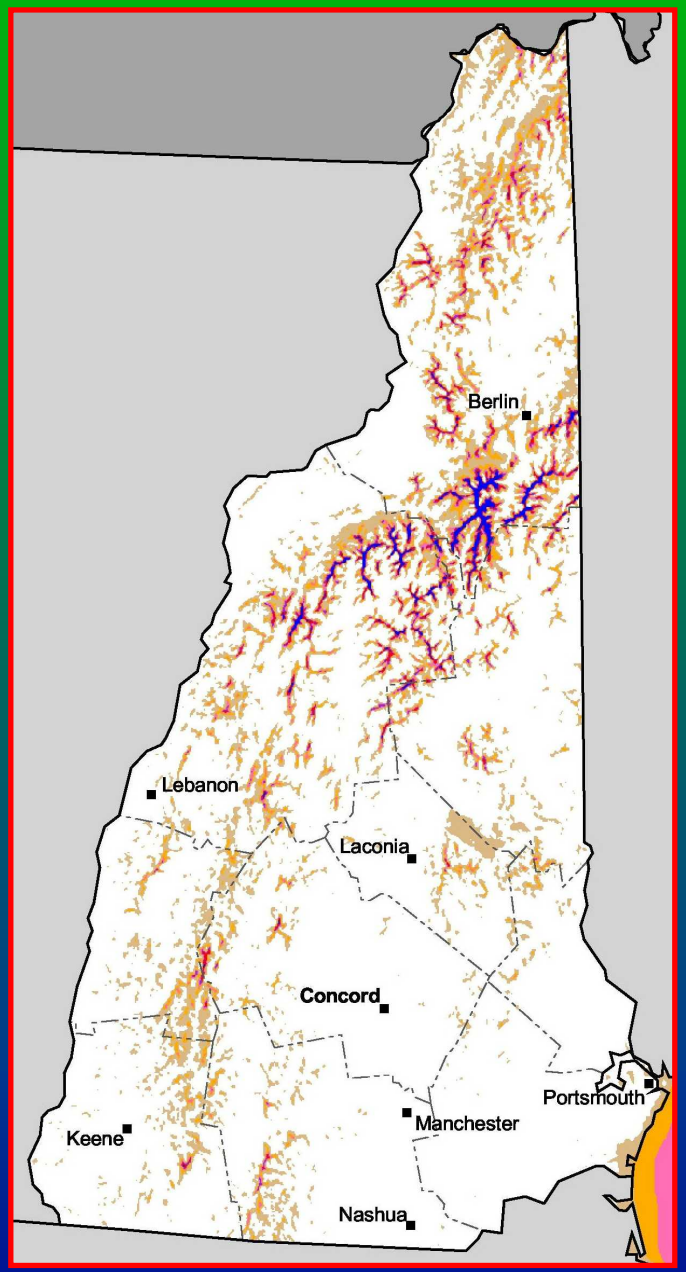
New Hampshire Wind Resource Map



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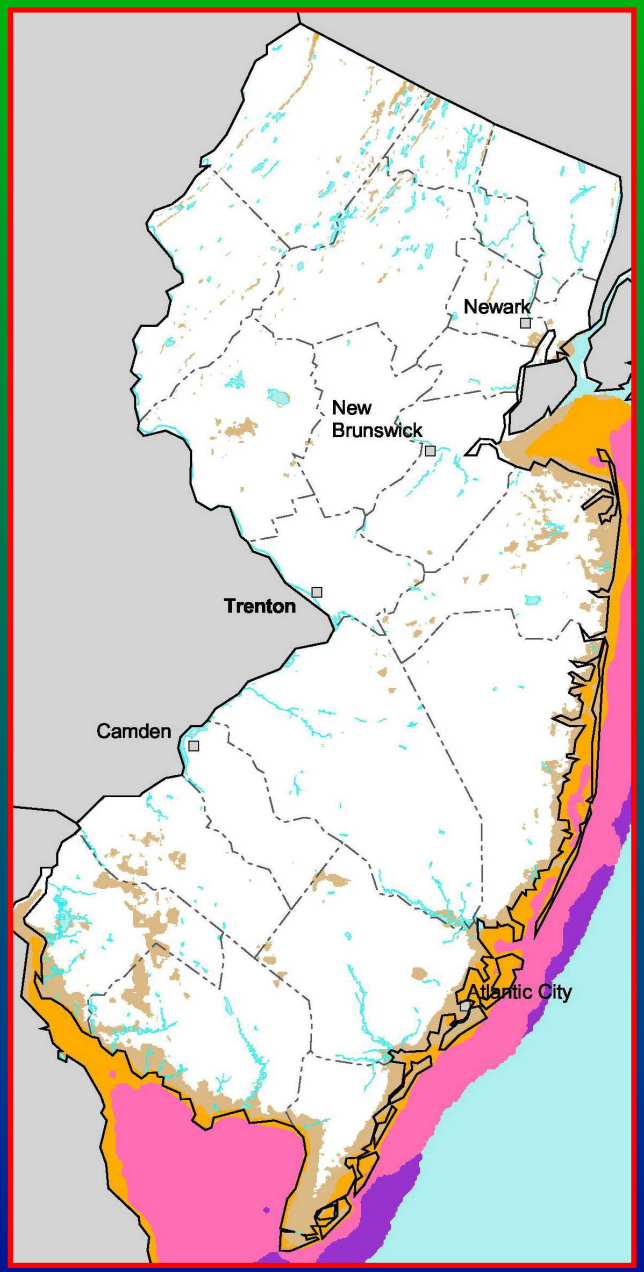
New Jersey Wind Resource Map



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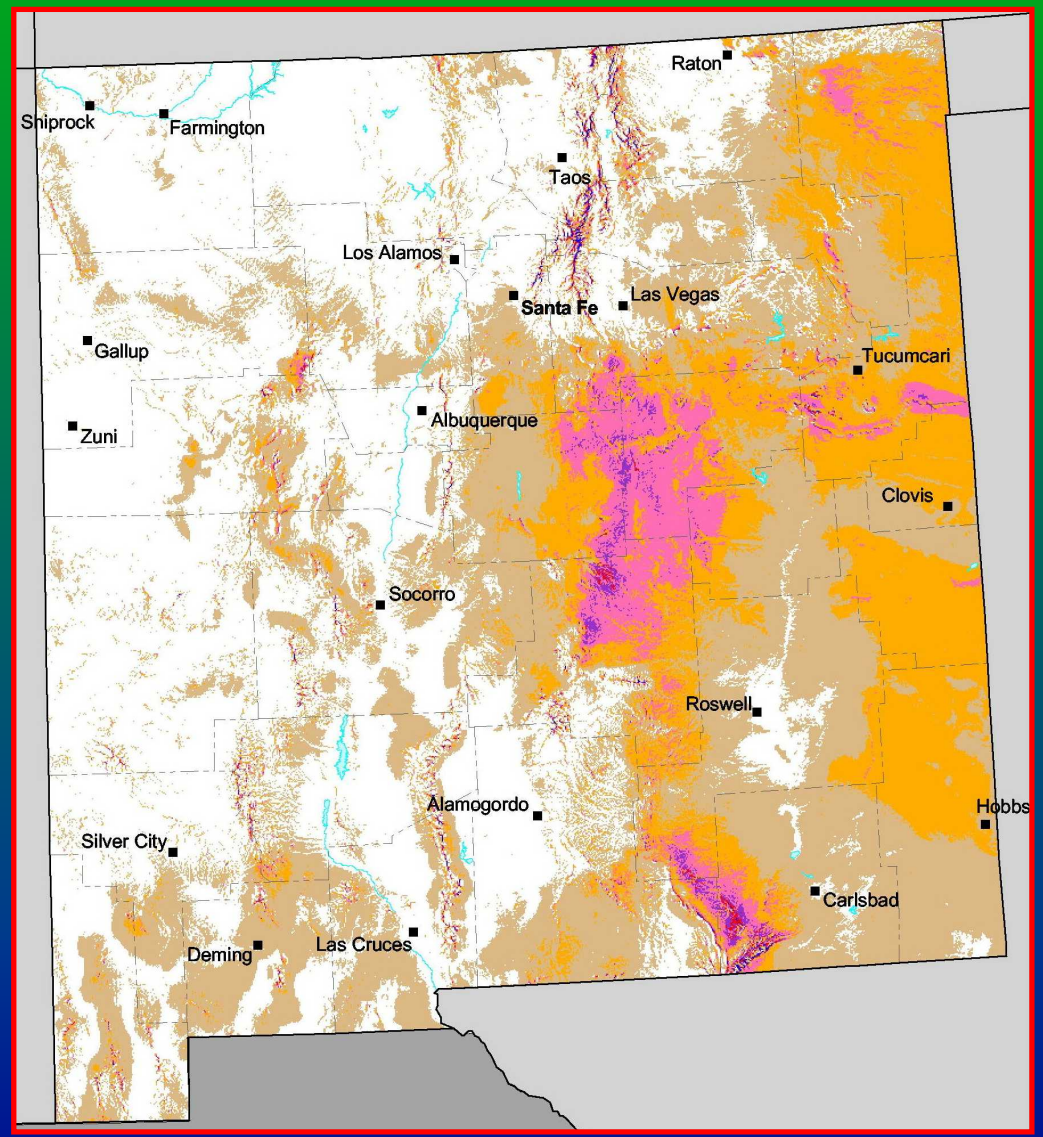
New Mexico Wind Resource Map



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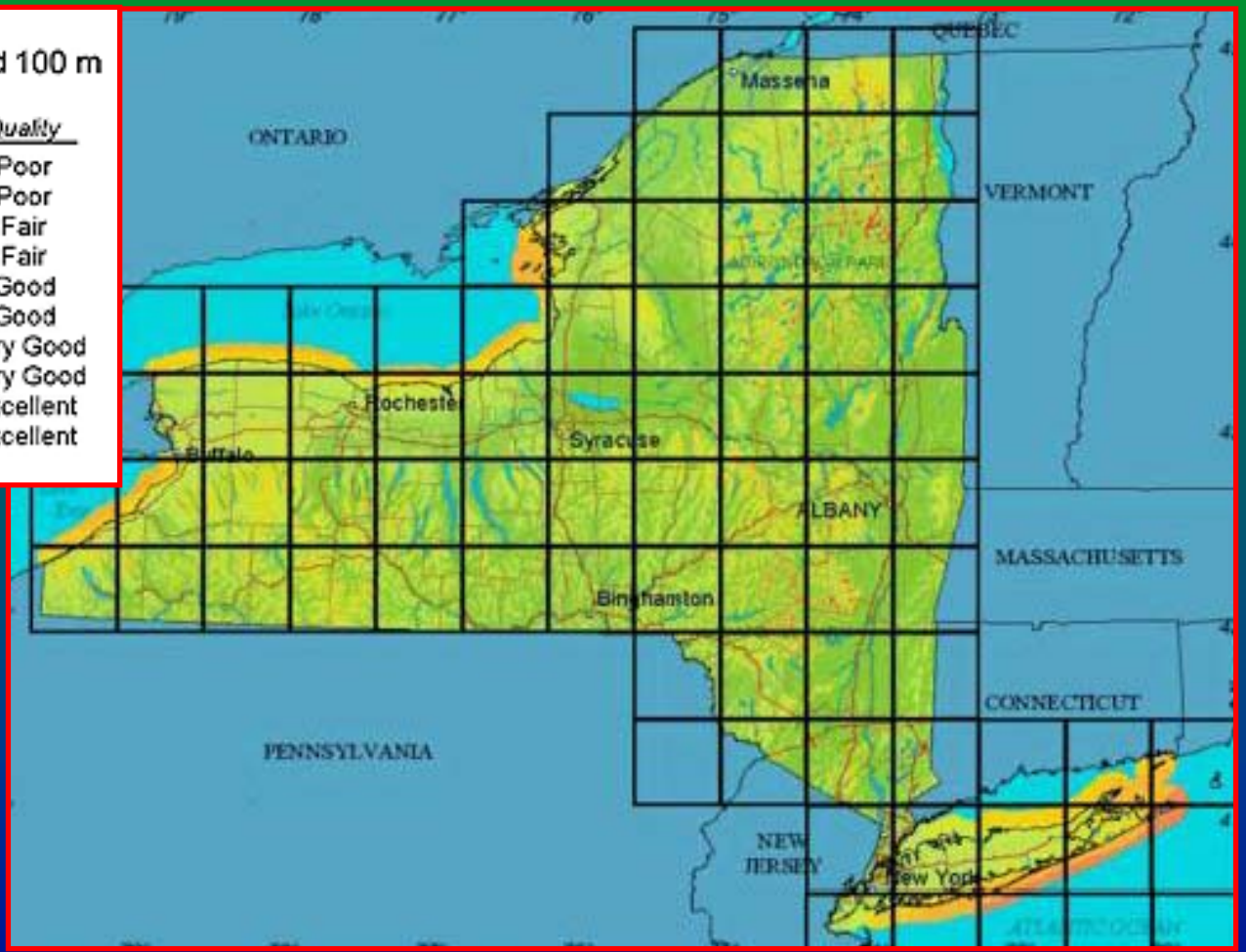
New York Wind Resource Map

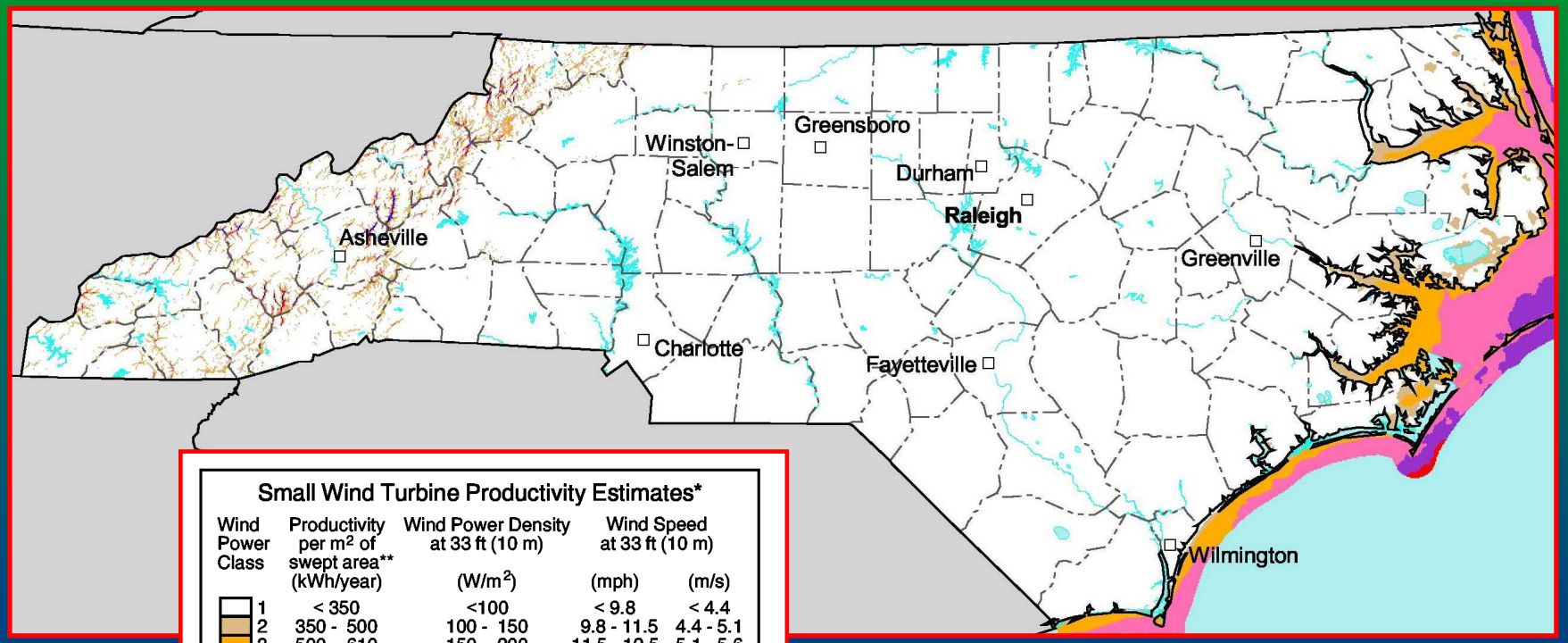
truewind.teamcamelot.com/NY/

Wind Resource at 65 m and 100 m

Mean Speed mph	Mean Speed m/s	Quality
< 12.3	< 5.5	Poor
12.3 - 13.4	5.5 - 6.0	Poor
13.4 - 14.5	6.0 - 6.5	Fair
14.5 - 15.7	6.5 - 7.0	Fair
15.7 - 16.8	7.0 - 7.5	Good
16.8 - 17.9	7.5 - 8.0	Good
17.9 - 19.0	8.0 - 8.5	Very Good
19.0 - 20.1	8.5 - 9.0	Very Good
20.1 - 21.3	9.0 - 9.5	Excellent
> 21.3	> 9.5	Excellent



North Carolina Wind Resource Map



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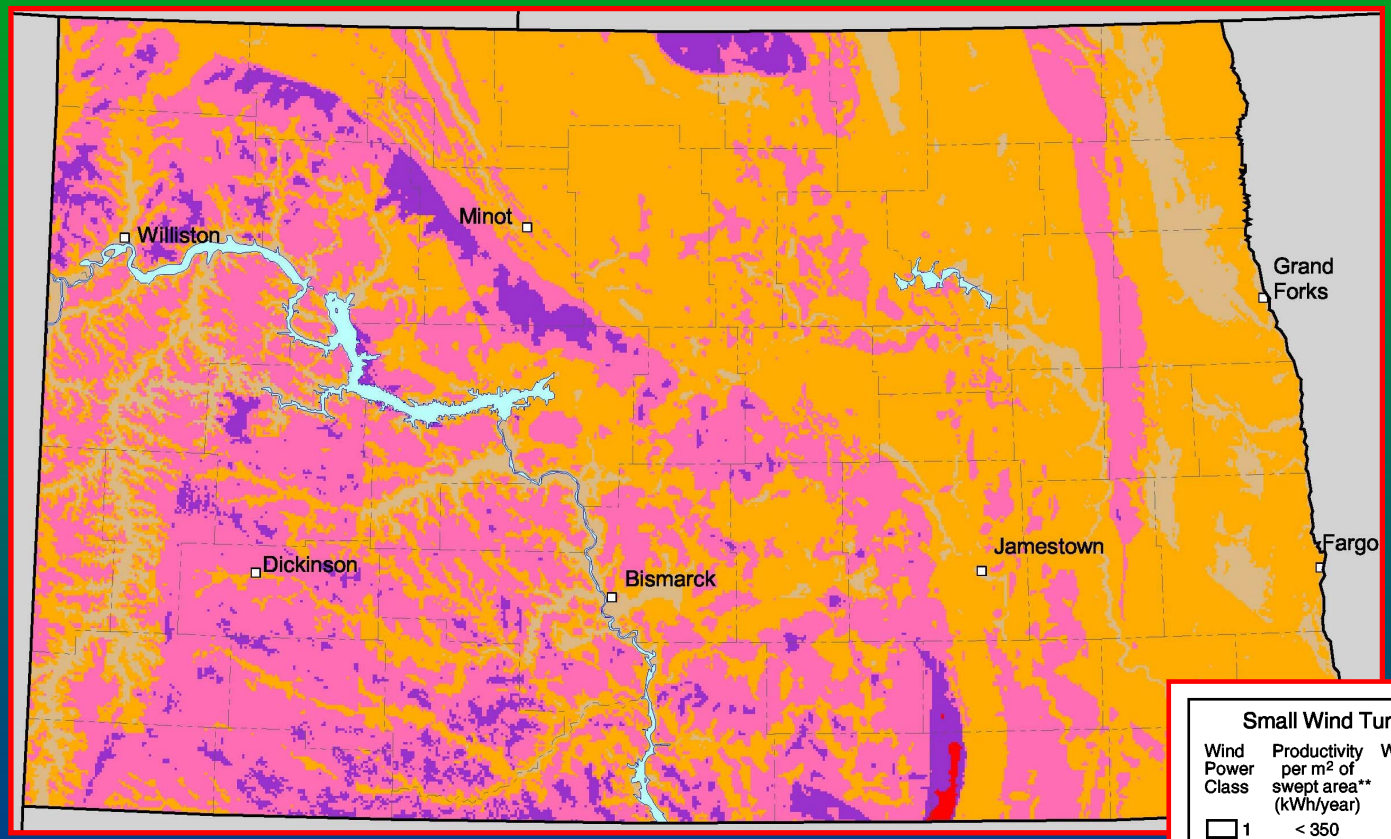
North Dakota Wind Resource Map



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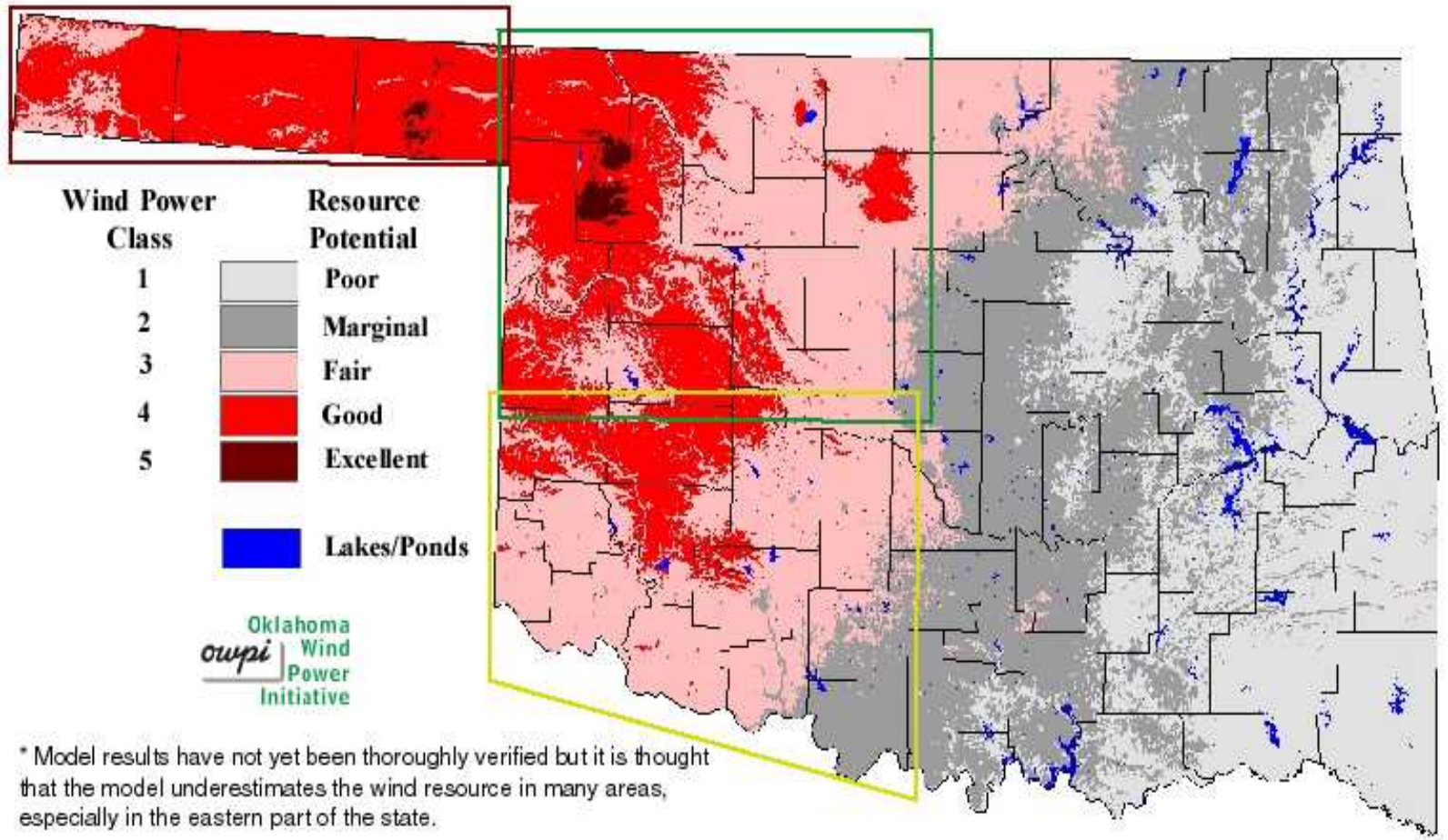
Oklahoma Wind Resource Map

www.seic.okstate.edu/owpi/WindRes/windmap.htm



Oregon Wind Resource Map

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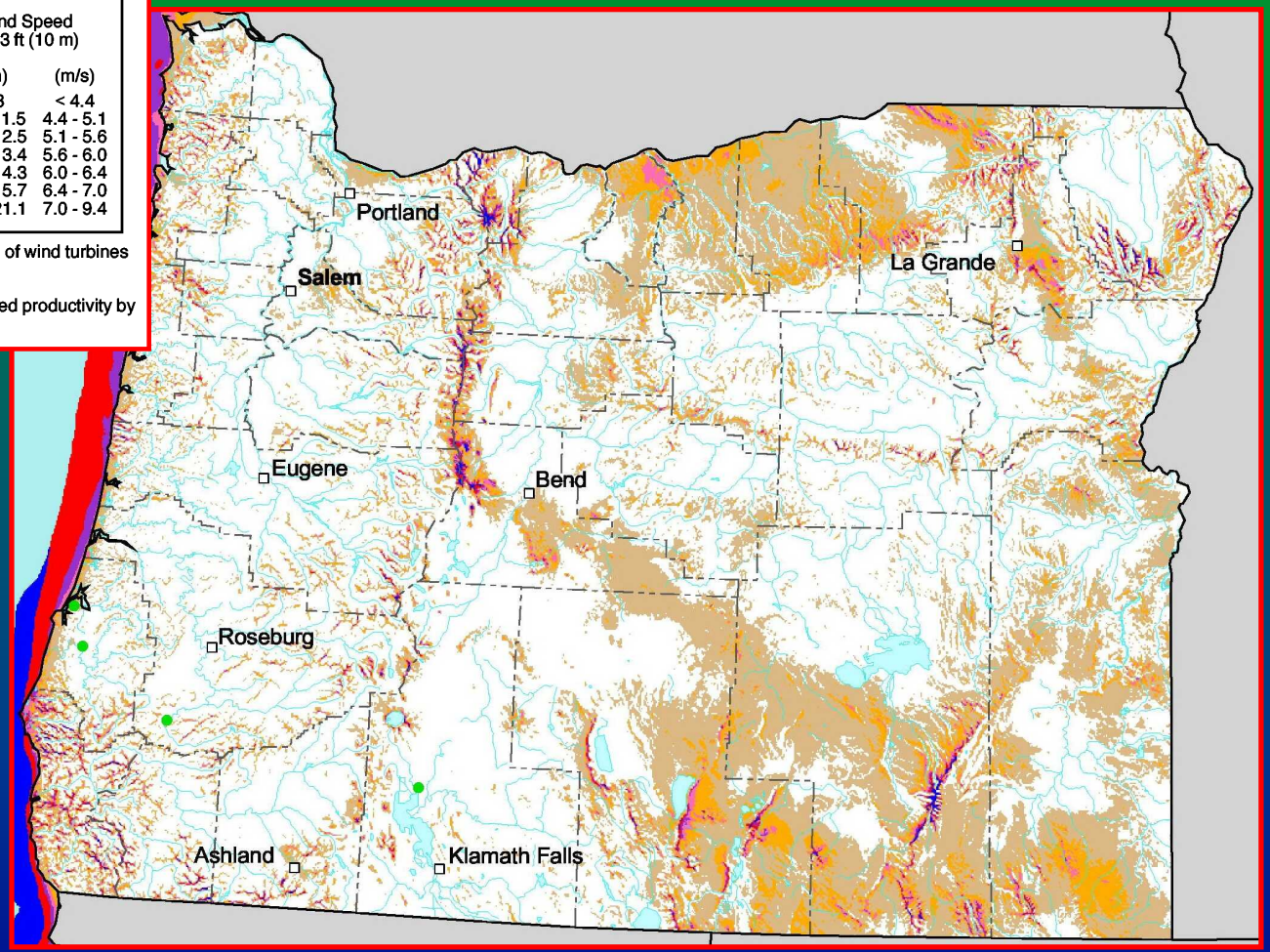
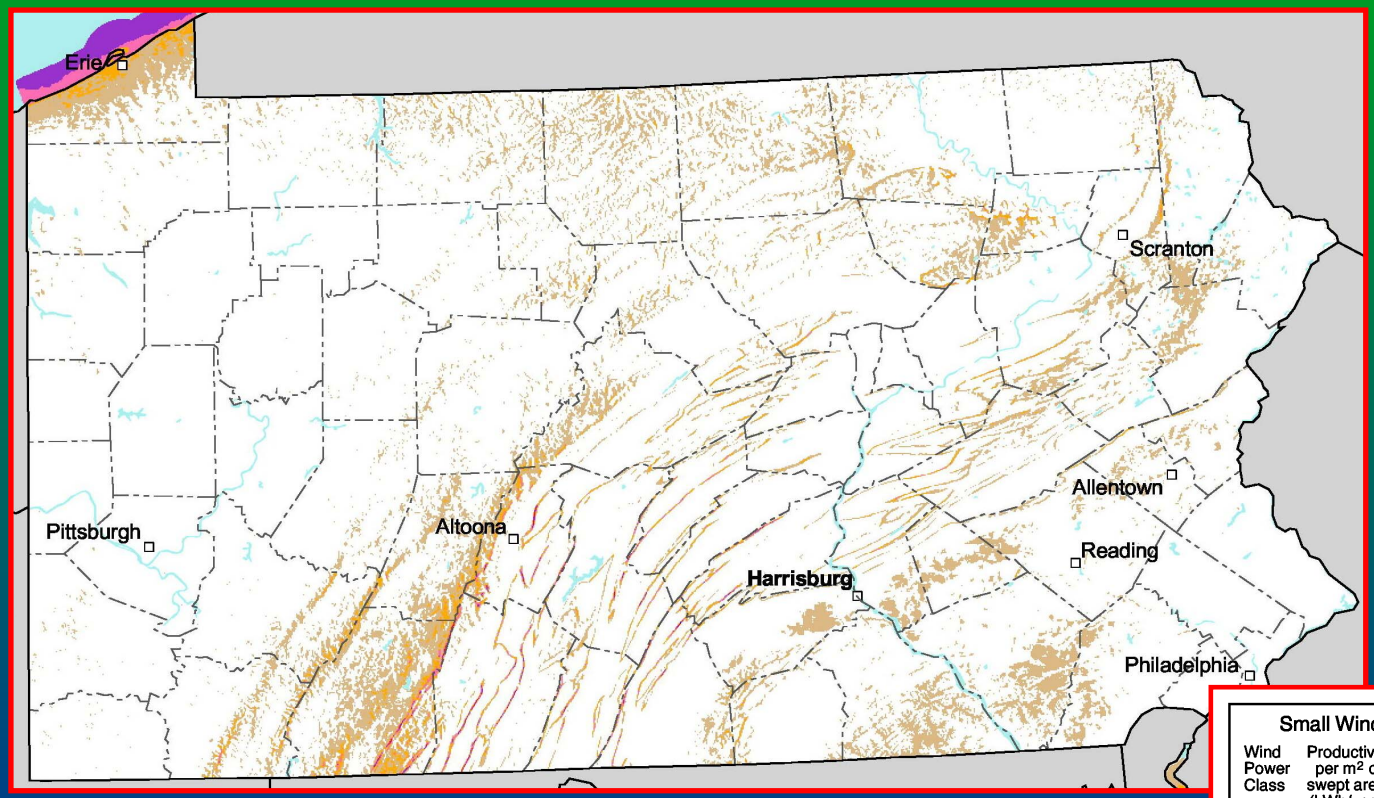
** For systems of different sizes, multiply the estimated productivity by the total swept area of the turbine.



Pennsylvania Wind Resource Map



Small Wind Turbine Productivity Estimates*

Wind Power Class	Productivity per m² of swept area** (kWh/year)	Wind Power Density at 33 ft (10 m) (W/m²)	Wind Speed at 33 ft (10 m) (mph)	Wind Speed at 33 ft (10 m) (m/s)
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4	610 - 690	200 - 250	12.5 - 13.4	5.6 - 6.0
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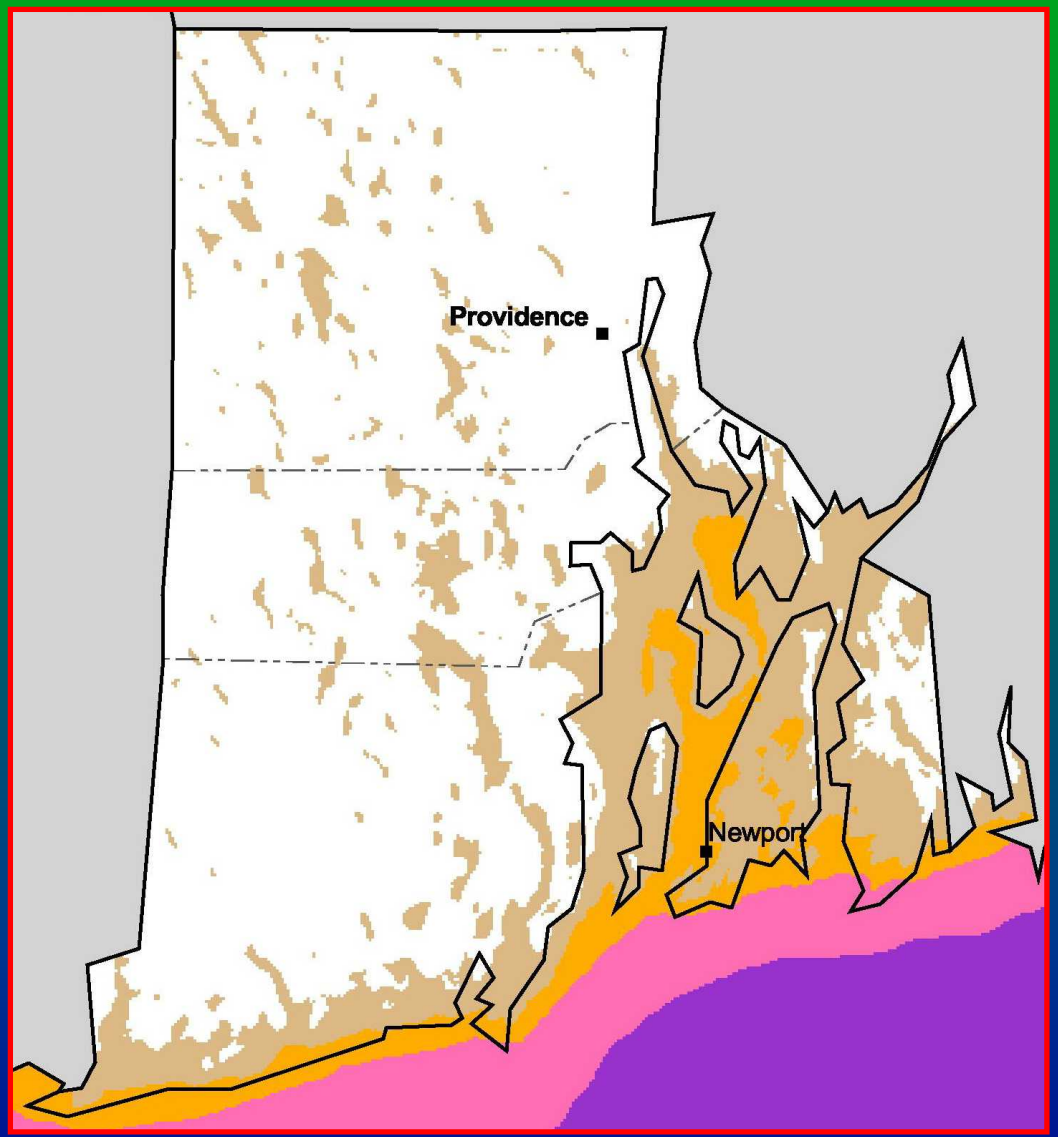
Rhode Island Wind Resource Map



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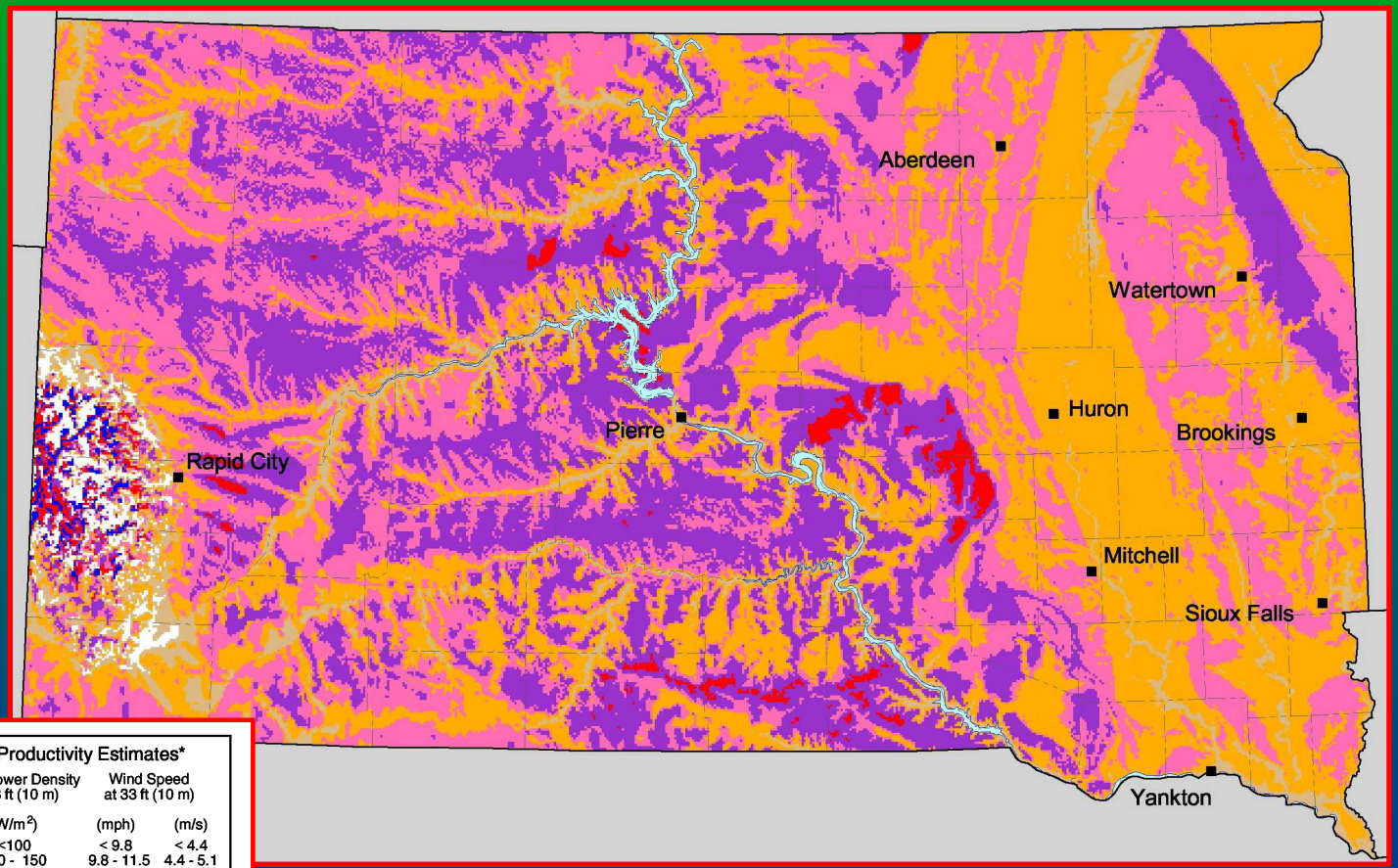
South Dakota Wind Resource Map



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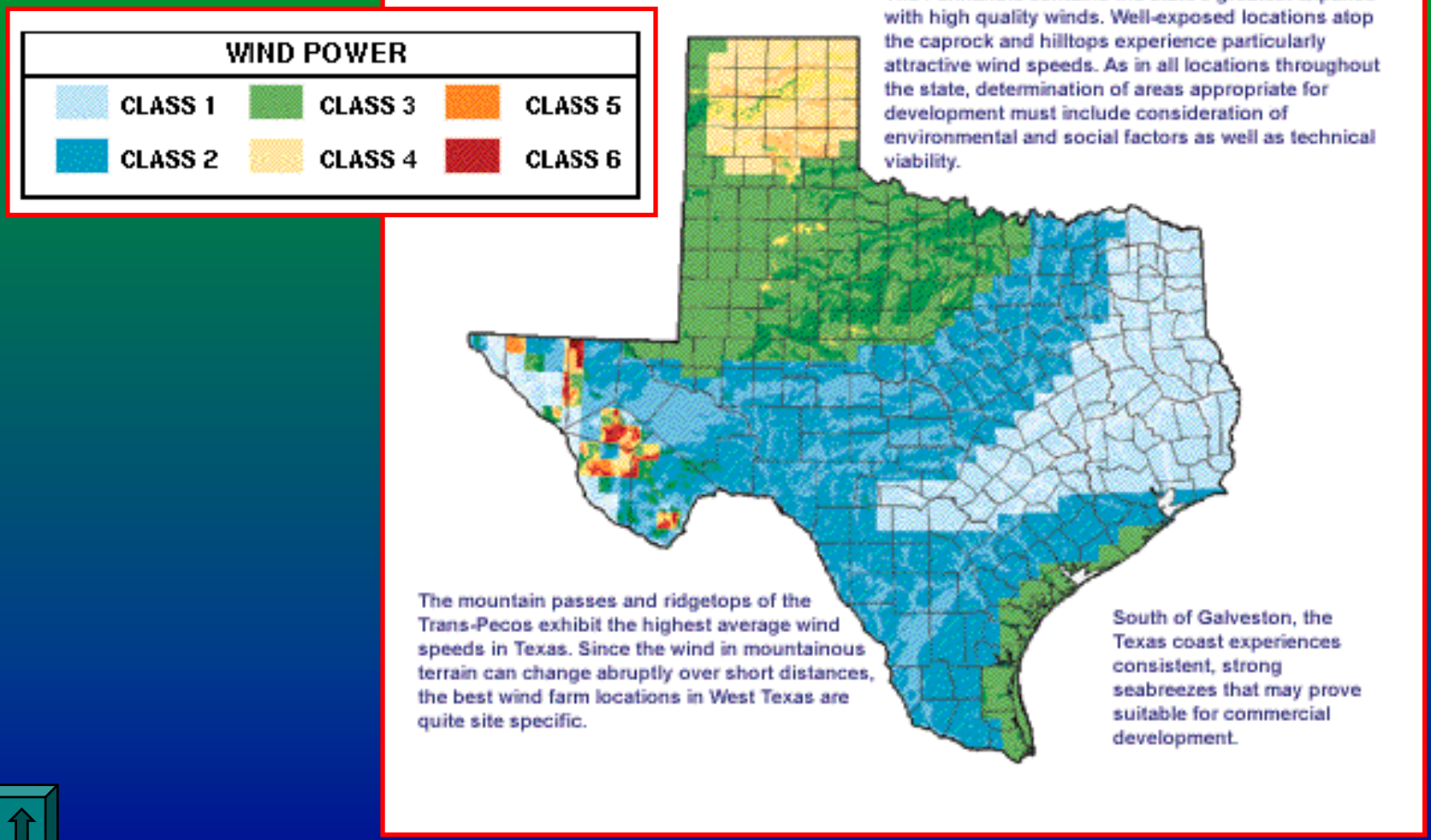
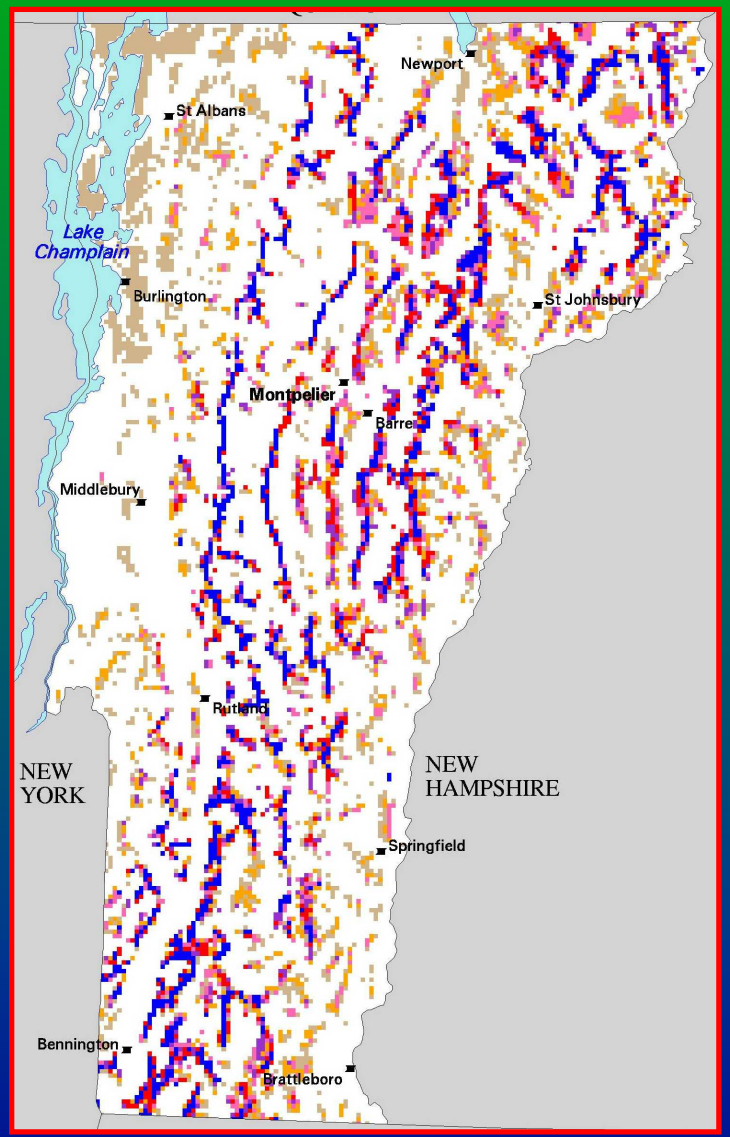
Texas Wind Resource Map

www.InfinitePower.org/reswind.htm



Vermont Wind Resource Map



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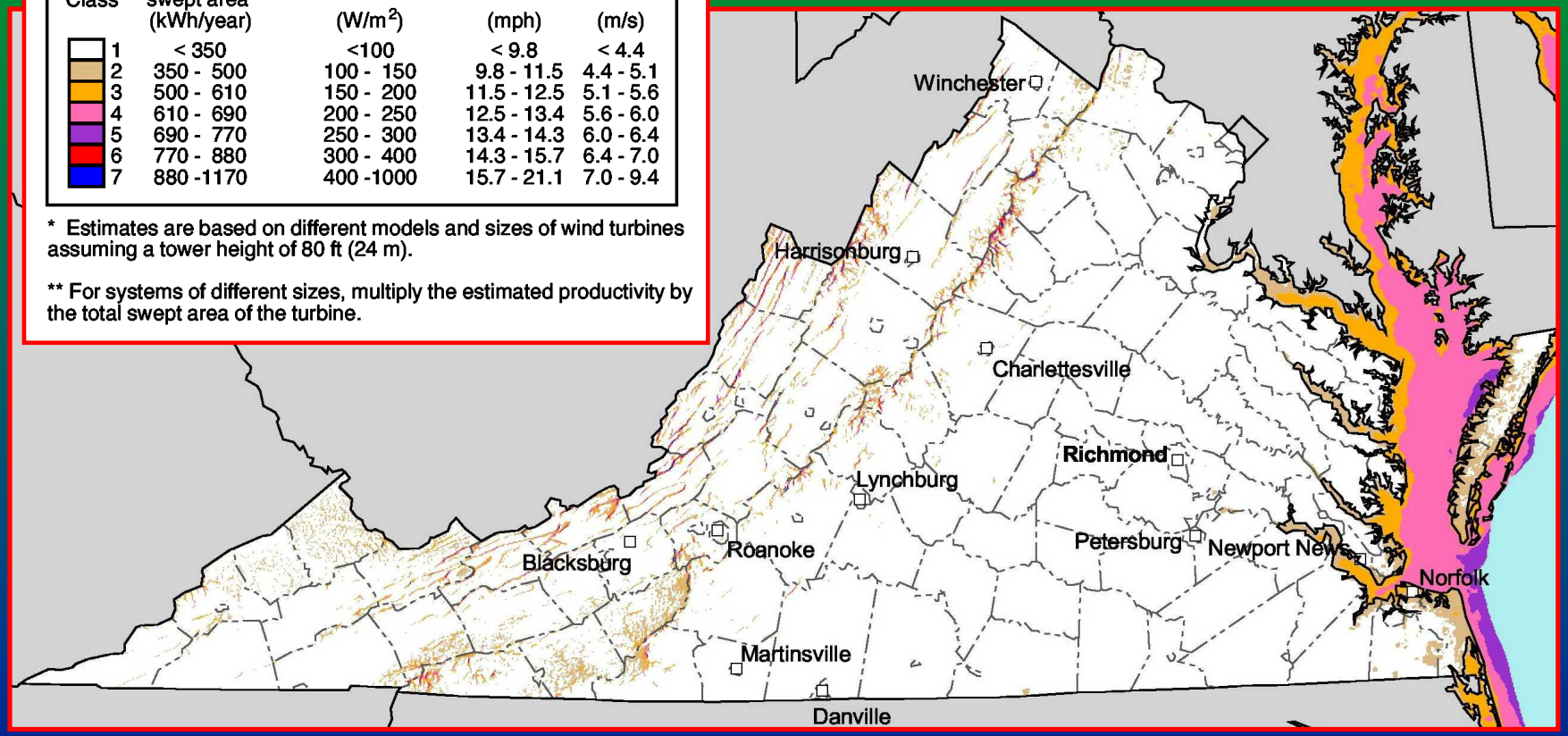
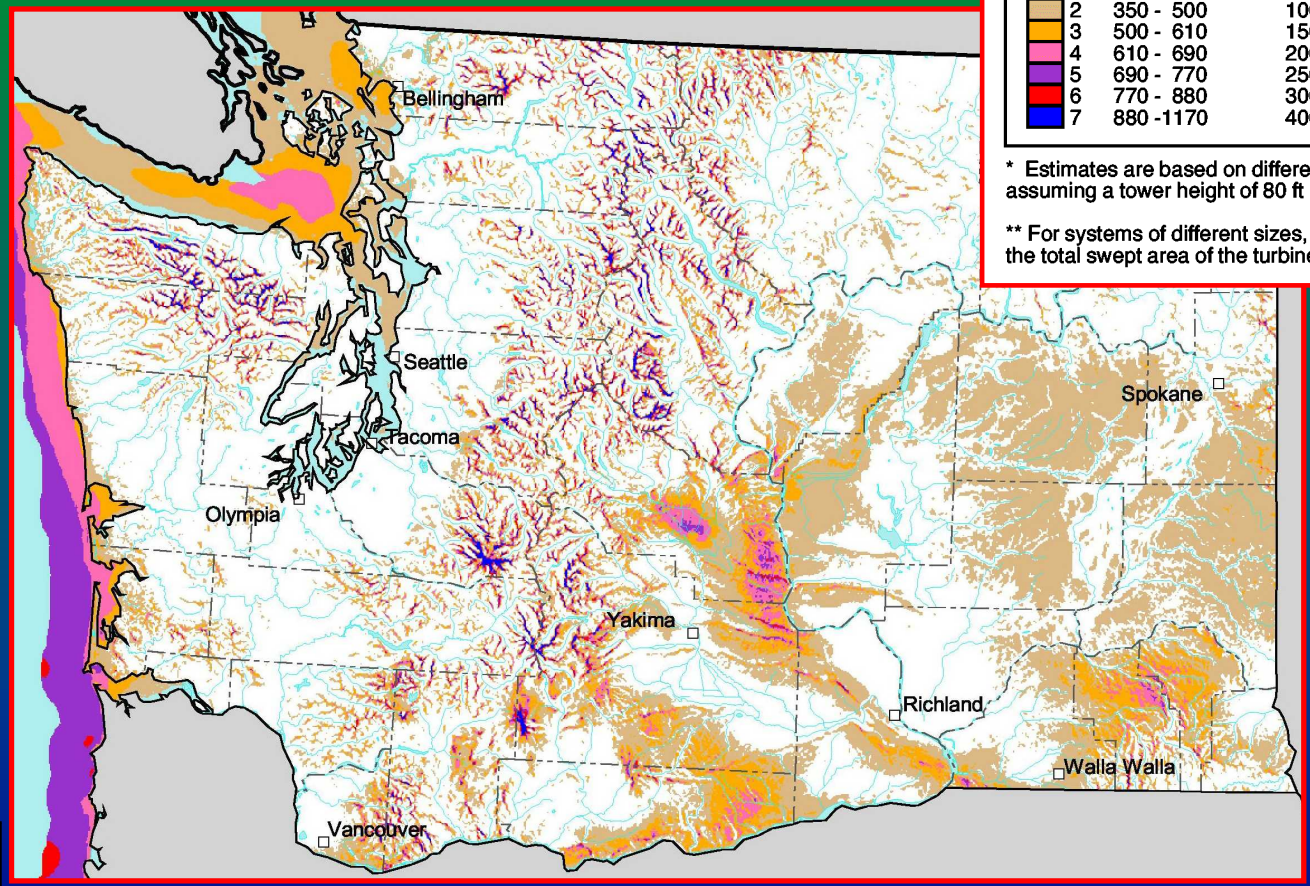
Virginia Wind Resource Map



Washington Wind Resources Map



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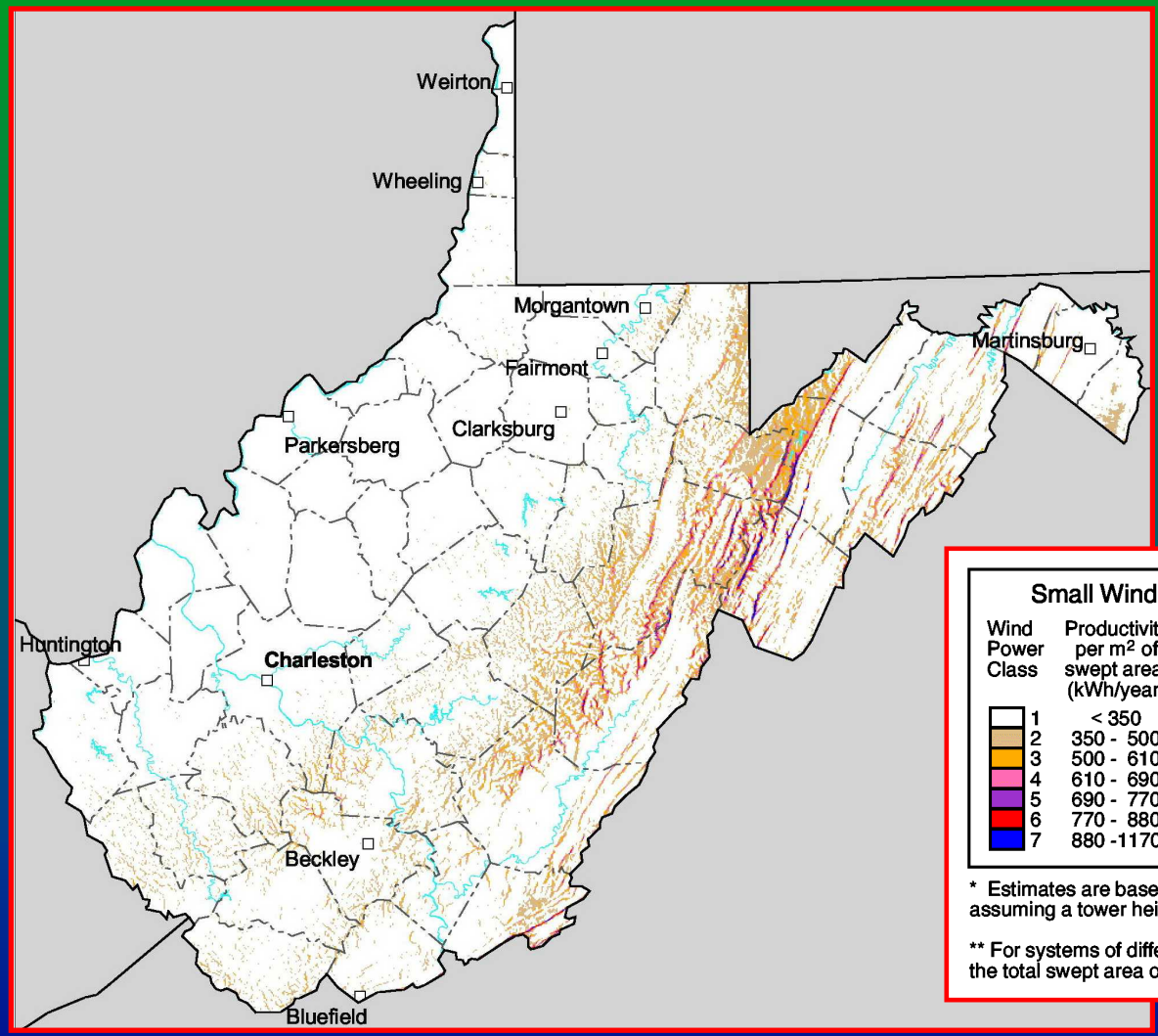
West Virginia Wind Resource Map



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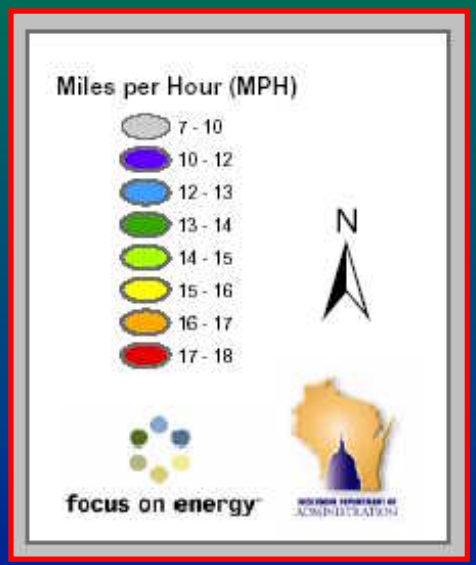
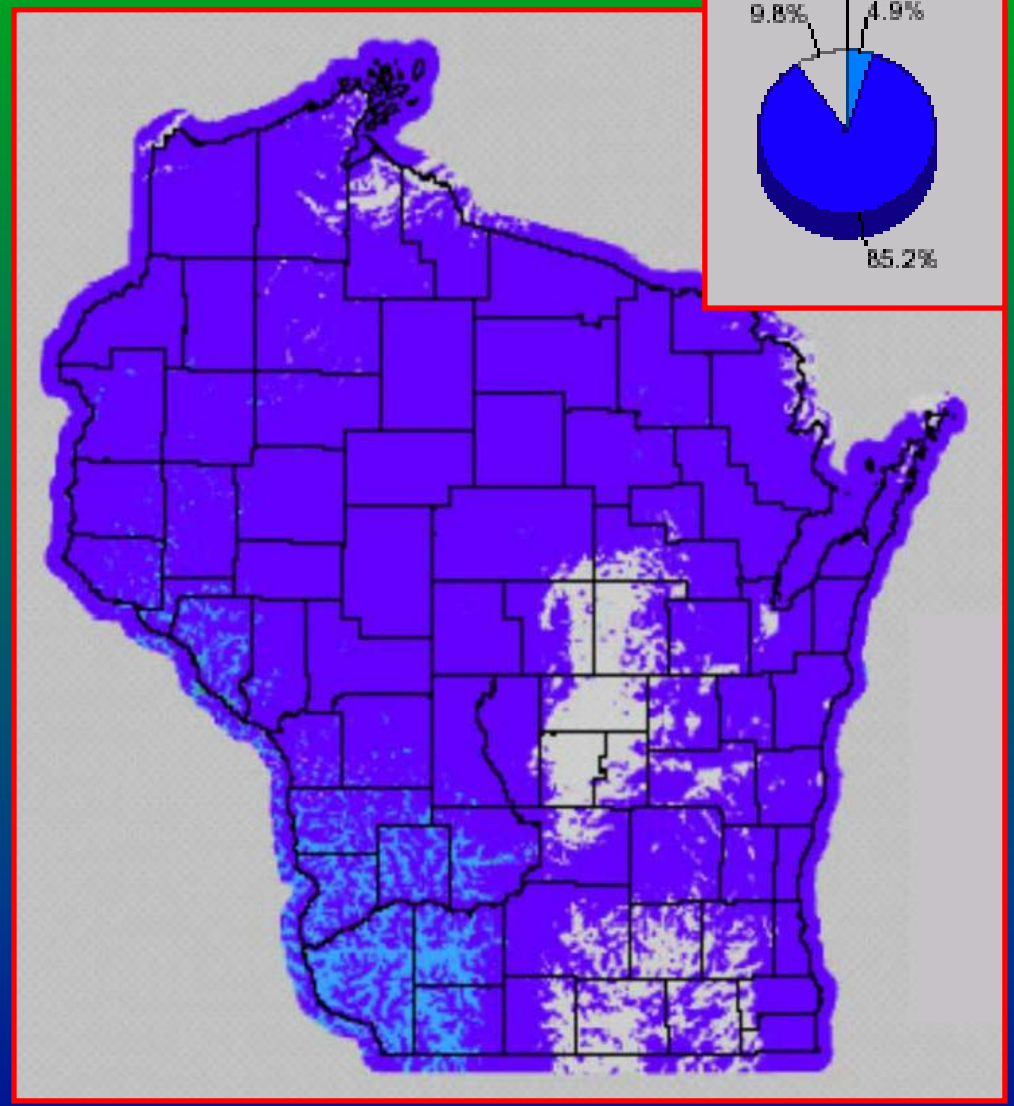
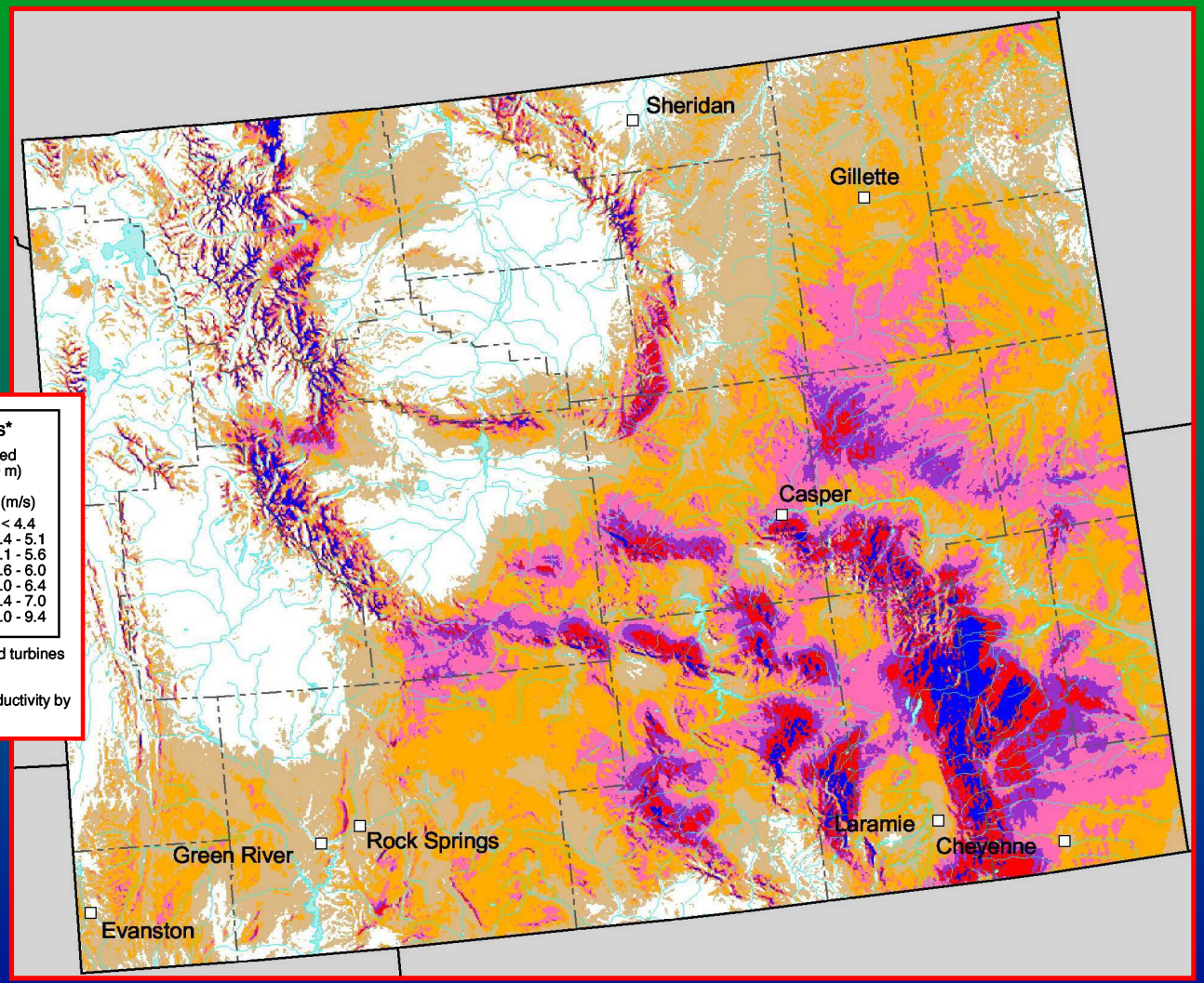
Wisconsin Wind Resource Map

http://www.focusonenergy.com/data/common/pageBuilderFiles/winds.pdf





Wyoming Wind Resource Map



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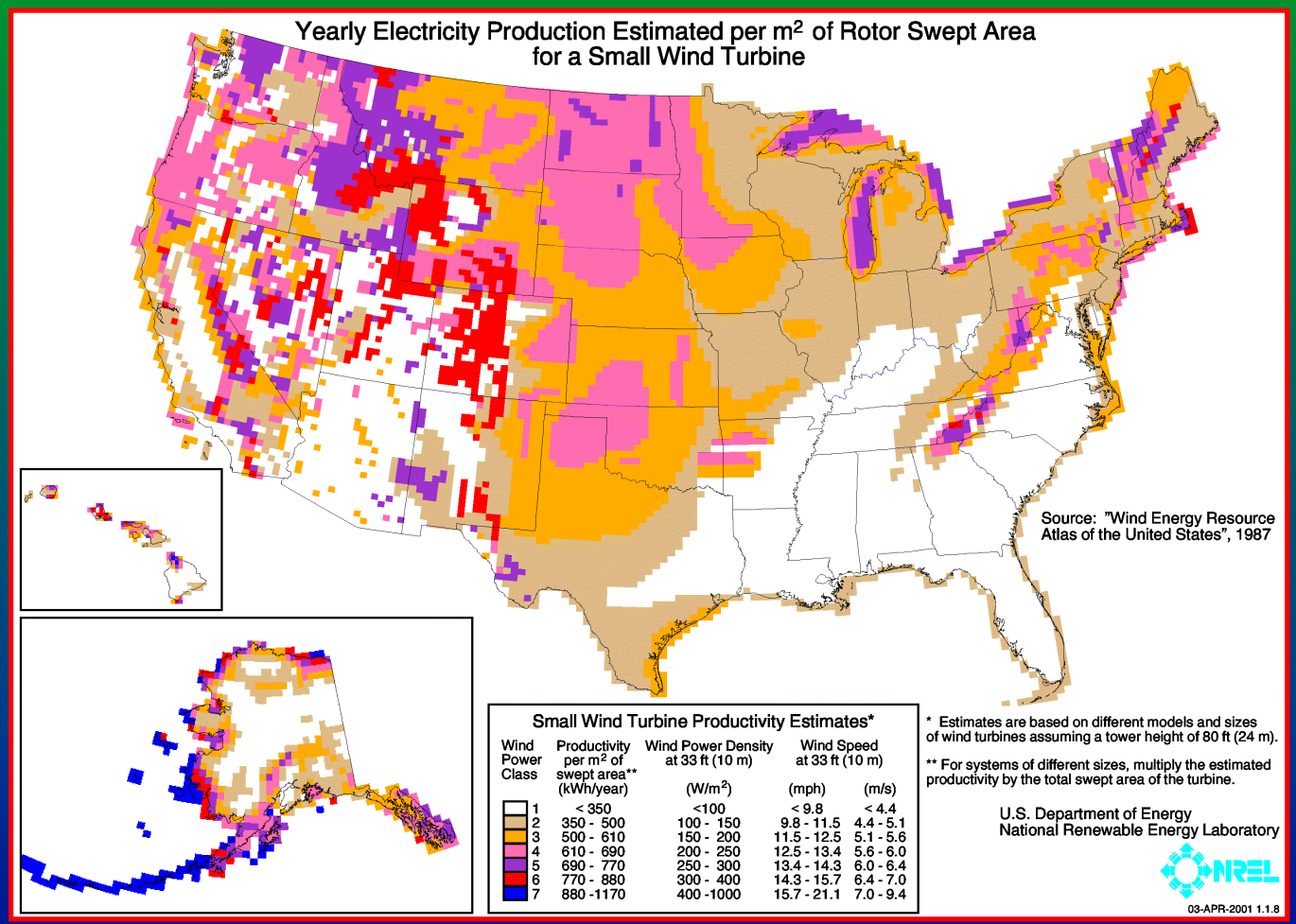
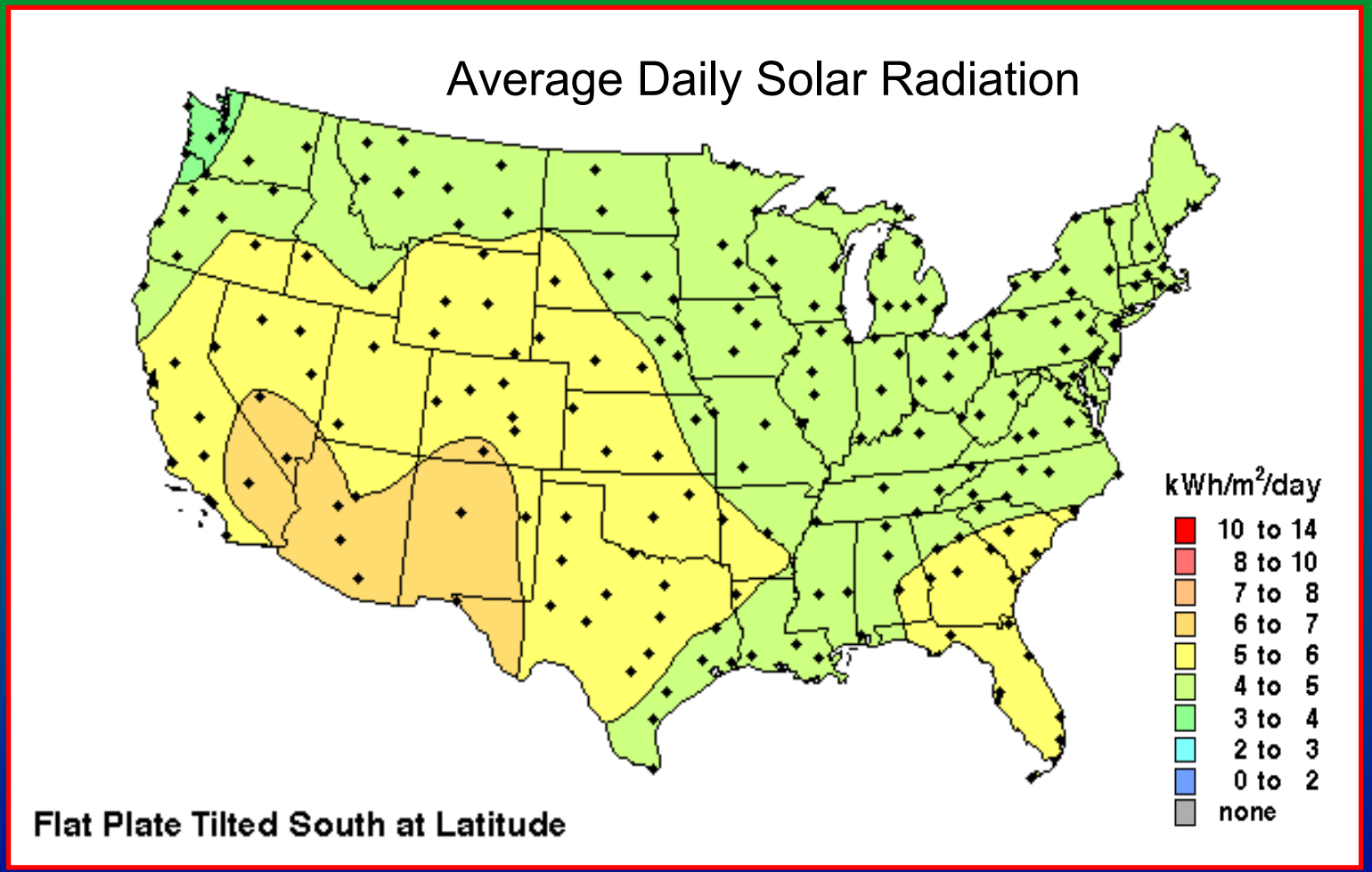
US Wind Resource Map

www.eere.energy.gov/windpoweringamerica/images/windmaps/wherewind800.jpg



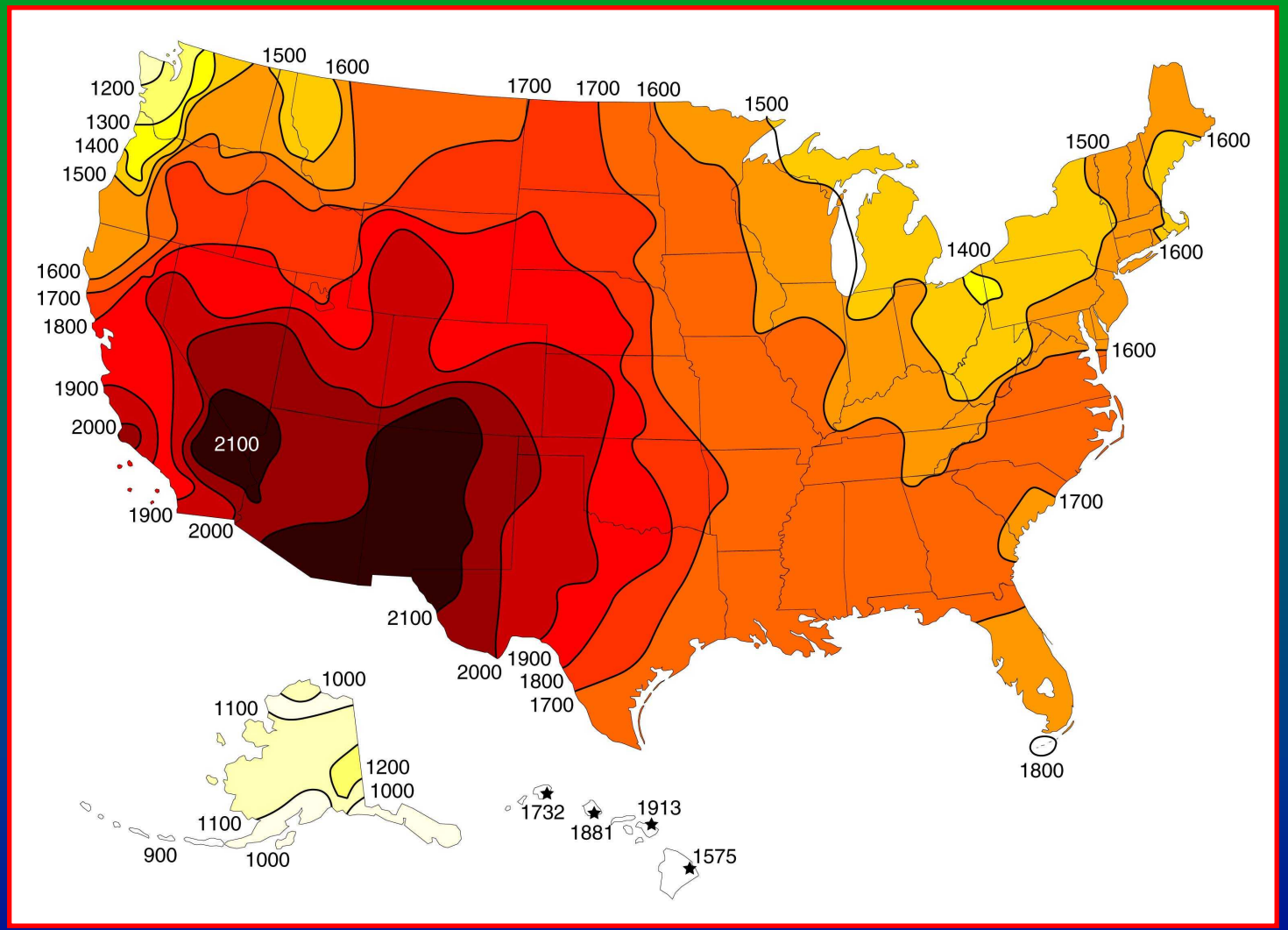
US Solar Resource Map

rredc.nrel.gov/solar/old_data/nsrdb/redbook/atlas/Table.html

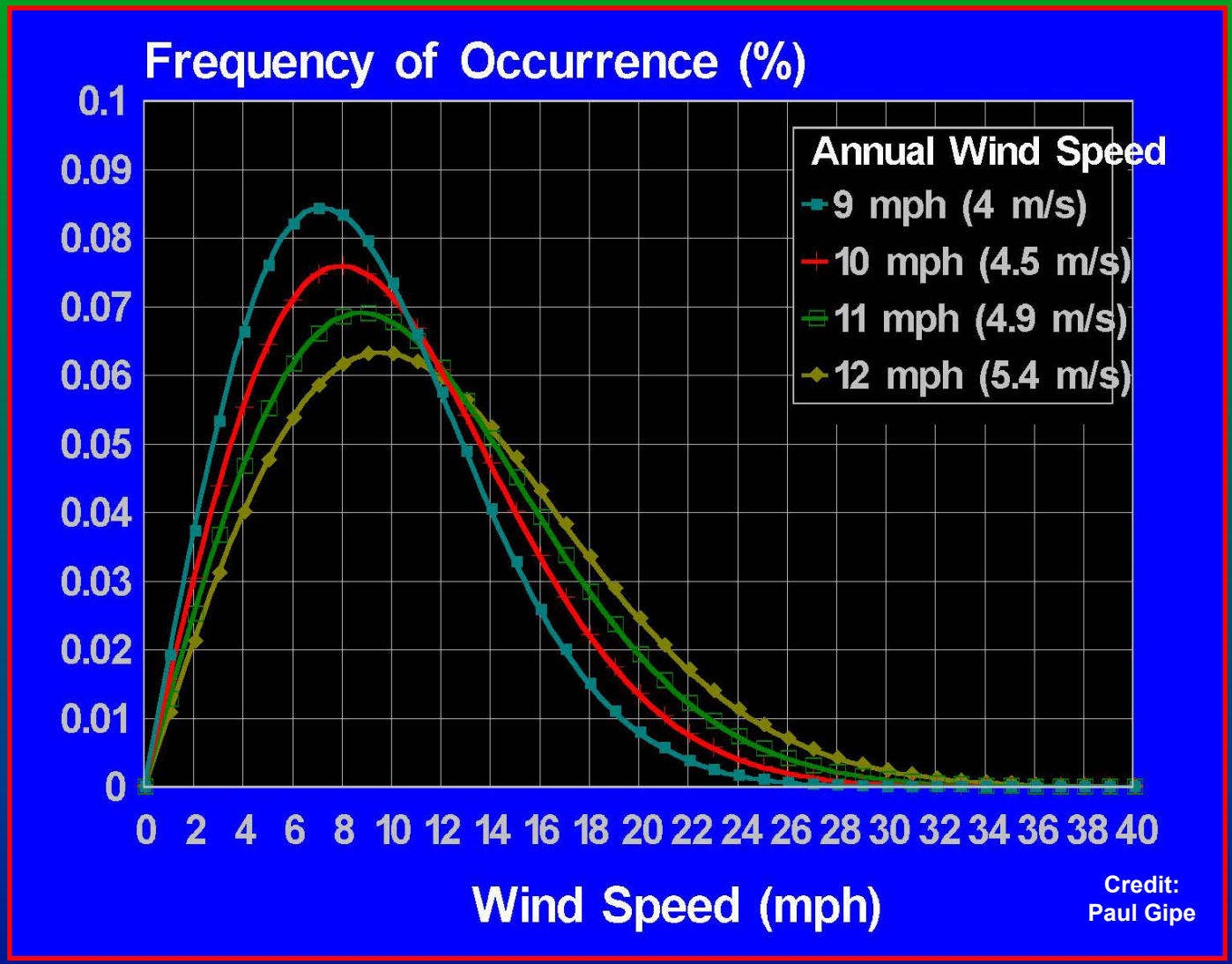


Productivity of a Net Metering PV System

kWh/y per kW of PV



Rayleigh Distribution of Wind Speed



Wind Power Classes

At 50 m height

Small Wind Turbine Productivity Estimates*

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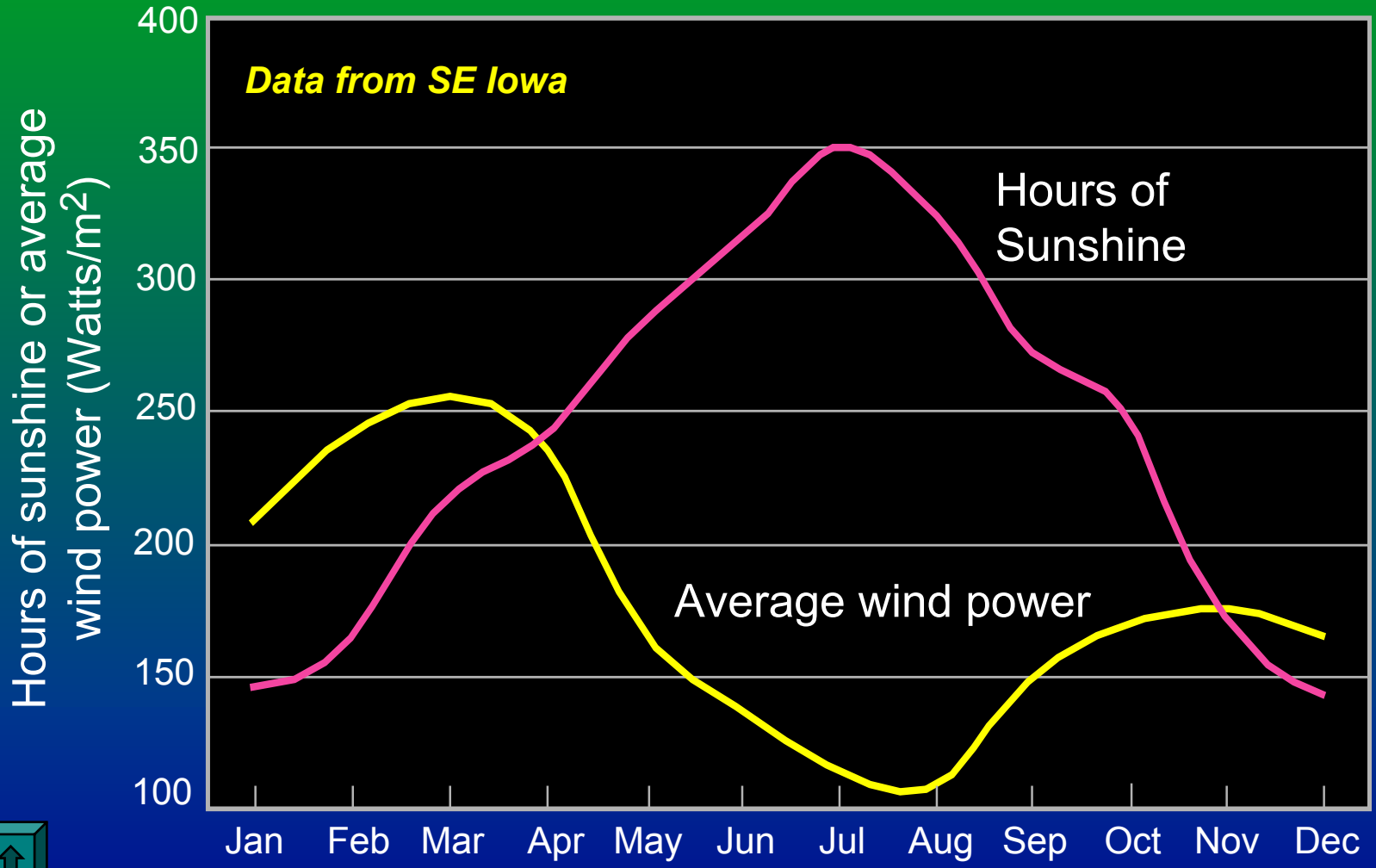
** For systems of different sizes, multiply the estimated productivity by the total swept area of the turbine.

Wind Power Classes at 50 m

Wind Power Classification

Wind Power Class	Resource Potential	Wind Power Density at 50 m W/m^2	Wind Speed[a] at 50 m m/s	Wind Speed[a] at 50 m mph
2	Marginal	200 - 300	5.6 - 6.4	12.5 - 14.3
3	Fair	300 - 400	6.4 - 7.0	14.3 - 15.7
4	Good	400 - 500	7.0 - 7.5	15.7 - 16.8
5	Excellent	500 - 600	7.5 - 8.0	16.8 - 17.9
6	Outstanding	600 - 800	8.0 - 8.8	17.9 - 19.7
7	Superb	800 - 1600	8.8 - 11.1	19.7 - 24.8

[a] Wind speeds are based on a Weibull k value of 2.0

Solar and Wind Resources are Complementary